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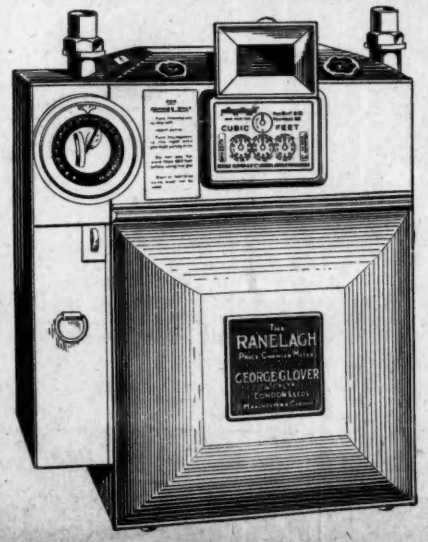

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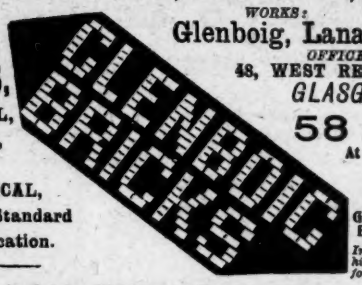

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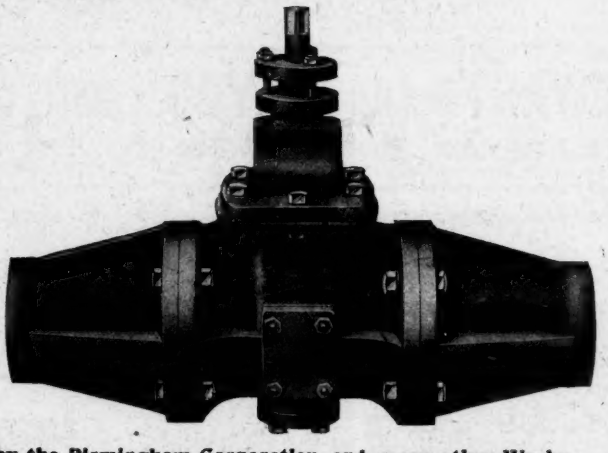

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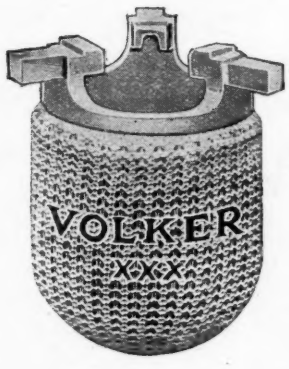

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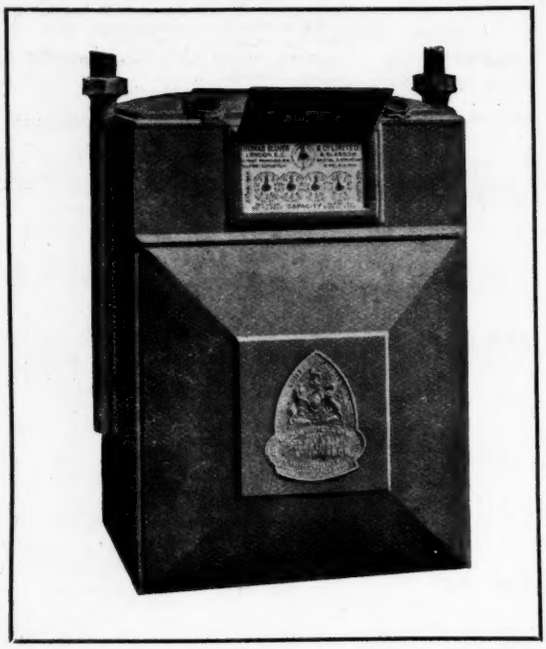

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VOL. CLIX., No. 3088.] WEDNESDAY, JULY 19, 1922. [74TH YEAR.

EDITORIAL NOTES.

Spent Oxide, Sulphuric Acid, and Sulphate of Ammonia.

THE report of the Chief Inspector under the Alkali Regulation Works, &c., Act (Dr. T. Lewis Bailey) is not such an extensive document as usual; but bulk is not necessarily any criterion of interest. There is interest in the report. Some of the information contained in it will not be news to producers of sulphate of ammonia, inasmuch as it deals with the year 1921—a year, as they are vividly aware, that possessed considerable difficulty for them. On the other hand, there are points in it which will encourage makers to hope for better things, particularly gas-works managements in respect of the position of spent oxide. The year was one in which at the very beginning the price of sulphate of ammonia fell tremendously, owing to the large surplus of nitrogenous fertilizers in the world. The coal strike also had a partial adverse effect, and so did the high price of sulphuric acid. High manufacturing costs and the lower market values for the product had the effect of causing some of the smaller works to find their ammoniacal liquor a positive nuisance, instead of a profitable bye-product. The Chief Inspector says the burden of these conditions has fallen heavily on gas-works and coke-oven plants. But in view of the much greater make of the gas-works, owing to so large a proportion of the coke-ovens of the country being shut-down, the burden has been proportionately greater on the gas-works.

It is not a particularly comforting reflection that, had it been possible to set-off the value of the sulphur in spent oxide against the cost of acid, the situation would not have been so bad. The position would not allow of this being done. Owing to the reduced demand for sulphuric acid, spent oxide stocks increased; and so gas-works particularly had to face the position of paying dearly for sulphuric acid, while suffering a reduced revenue from spent oxide. The fact that the acid plants could only be operated at a relatively small percentage of their capacity raised the costs of production; and this naturally re-acted upon the industries utilizing the acid. However, so far as spent oxide is concerned, the report holds out hopes of relief. It is a rational course to pursue to make the largest possible use of home-produced raw material for the making of sulphuric acid, especially when this presents collateral advantages. Naturally, manufactories equipped solely for the burning of pyrites cannot shunt at will from pyrites to the use of spent oxide. But it is interesting to learn that a number of them have taken steps to instal plant suitable for the burning of spent oxide; and this opens the way to the relief of a very difficult situation. "It's an ill wind that blows nobody "good." The acid makers have been experiencing a difficulty in dealing economically with cupreous pyrites residues; and so there is in this respect an advantage in handling a non-cupreous material for acid making. Perhaps, too, the negotiations that a Committee of the National Gas Council have had with the makers have helped to induce the latter to make changes which will bring spent oxide into larger use for acid production. This is wise, in view of the expected growth in gas production. It is also mentioned that in a number of works, American sulphur is now being employed as an enricher of spent oxide. This permits of the production of a practically non-arsenical acid, which is an advantage over arsenical pyrites, as de-arsenication is always troublesome.

Through the coal strike and trade depression, there was in 1921 a remarkable falling-off in the production of ammonia products manufactured in the United Kingdom. Expressed as 25¾ p.ct. ammonia, in 1920, the total production was 397,937 tons, while last year it fell to 253,253 tons —a reduction of no less than 144,684 tons, or approximately 36·3 p.ct. In every producing quarter, there was a recession; but the bye-product coke-ovens were the greatest contributors to the total reduction, for their yield fell from 150,012 tons in 1920 to 56,427 tons in 1921—a decrease of no less than 93,585 tons. In the circumstances of the year, with water-gas plants for best part of three months working strenuously, gas-works, in our opinion, did remarkably well; for their production was 150,228 tons, or a decrease of only 17,158 tons compared with 1920. This is bad enough; but we had rather anticipated it might have been worse. Shale works came next with a lessened output by 16,430 tons; producer gas and other carbonizing works, with a drop of 10,857 tons; and iron-works, with a decrease of 6654 tons. There we have figures which indicate how, in respect of this one commodity, the coal strike was responsible for the decline of a good revenue-producing business; and this is an example of many items that have not been taken into the calculations of those who have made rough estimates of what the coal stoppage cost the country. The actual sum can never be calculated. The report records the fact that greater recognition is being given to the advantages of a dry and neutral sulphate for agricultural purposes; and that much activity has been displayed in perfecting the methods of production. Attention is also drawn to two technical points. One is the insufficient consideration given at some works to the condensers for cooling the foul gases, and the second is the advantage of heap purifiers over enclosed ones.

Technically, the most interesting part of the report is that which deals with the rendering of the effluent spent liquors fit for ready disposal. These liquors are capable of giving considerable offence by reason of the phenoloid and other vapours that accompany the steam that is given off. The usual process of settling and cooling does not ensure freedom from difficulty in disposing of the effluent liquor, as the managers of many works know, through having been held up owing to local authorities objecting to deal with it. When one remembers that the total volume of effluent liquor from a still fed with 8-oz. liquor theoretically exceeds 4900 gallons per ton of sulphate made, and with 10-oz. liquor about or somewhat less than 4000 gallons, and that these figures are approximately borne out in practice, the matter is seen to be a very serious one. However, Dr. Bailey, Mr. Linder, and other members of the staff have been investigating the matter, both in the laboratory and under working conditions at the Hornsey Gas-Works, through the interest of the Engineer (Mr. J. W. Buckley). The conclusion come to from the laboratory research was that it would be possible to remove the bulk of the phenol by simple treatment, at 90° to 95° C., with boiler-fire gases. Steam treatment by itself, though it undoubtedly effects the removal of the bulk of phenol, still leaves the liquor with its original colour. To decolorize the liquor, a proportion of mineral acid is needed. Thus it would appear to be practicable to decolorize an effluent liquor by treatment with boiler-fire gases and steam in a suitable scrubber, and at the same time to volatilize a large part of the phenoloid bodies, with the production of a deodorized and almost colourless effluent suitable for admission to the sewers. Mr. Buckley considered the laboratory disclosures warranted the erection of a large-scale unit of plant. This was done as described in the report, in which data will also be found as to the results achieved at Hornsey. In connection with the first plant erected, additional

scrubber power and lagging had to be resorted to, together with an increase in the size of the packing. With these modifications, there was removal of 56 p.ct. of the phenols, and 7·5 p.ct. of the thiocyanate, and the oxygen absorbed was reduced to 31·5 p.ct. Having regard to the stage of the investigation, the results are looked upon as highly satisfactory. The report bears date in February last; and further improvements were then in contemplation. Possibly before this they have been made, and the results have been further enhanced.

Economics of Sulphate Production.

AN important subject was raised in a paper by Mr. P. Parrish at the annual meeting of the Society of Chemical Industry. A digest of the communication was published in the "JOURNAL" last week; but we now wish to emphasize its significance by brief reference. The title of the paper was "The Design and Working of Ammoniacal Liquor "Stills;" but the main object was to direct attention to a possible substantial economy in the cost of sulphate of ammonia production. The makers of sulphate plants will read what Mr. Parrish has to say with no less interest than the users of their plants; for it is abundantly clear that the author is anything but satisfied with the advances that have been made in the plants, or with the consideration that has been given to the economics of production. Chemical engineers, he says, have a long way to go before attaining perfection in the design of the stills. As to manufacturing economies, in the present position of the nitrogenous fertilizer markets and in the outlook in respect of potential production, the users of sulphate of ammonia plants will need all the efficiency they can realize in the working of their plants to make them more secure in a competitive sense. They cannot rely upon any artificial means for controlling markets, with the sources of production expanding as they are doing to-day.

Reminding us that from gas-works, coke-ovens, and shale distillation plants, the approximate normal production of sulphate of ammonia is 300,000 tons a year, the author sharpens curiosity by telling us that, by a modification of the arrangement of distilling plant, the cost of steam for that production (which steam represents something like £270,000) can be reduced to at least one-half that sum. This would represent 9s. per ton, and that is an amount well worth having, quite apart from the question of the national importance of conserving fuel through higher efficiency in all industrial operations. Analyzing costs, Mr. Parrish finds that still-cleaning represents 0·2 p.ct., labour in the operation and control of the still 4 p.ct., and steam about 10 p.ct. Obviously then steam is the dominant factor. But at the present time the efficiency of the process, from the heat conservation point of view, is only 32·5 p.ct. Mr. Parrish indicates what he has in mind, and probably what he has been experimenting upon, when he says that a special multiple effect arrangement of plant, combined with a judicious system of interchange heating, would appear to be the ideal plant to ensure a satisfactory conservation of heat so as to render the operation of the distillation of gas liquor more nearly self-supporting than it is to-day with existing plants. With reference to the fuel-saving indicated by the author, it is interesting to note that, in the course of the discussion, the Chairman (Mr. W. H. Coleman) mentioned the adoption by him of a continental still—the Mallet—in which the whole of the steam required per ton of sulphate is represented by an expenditure of 9⅛ cwt. of coal. That is getting, at present coal prices, very close to the 9s. per ton of sulphate to which the author's figures work out.

An interesting suggestion was made by Dr. E. W. Smith, also in the discussion. Now that the therm basis of charging for gas is in force, he is of opinion that all gas undertakings should extract benzole from gas. This, of course, largely depends upon the price that can be secured for crude benzole in relation to the value of the B.Th.U. extracted from the gas. That by the way. The suggestion which followed was that to him it was obvious that any gas undertaking which does not employ an acid catch for ammonia extraction prior to the purifiers is wasting money and energy. In his opinion, it would be an easy thing to produce a liquor of 15 or 16 oz. strength with an acid catch; and in this way eliminate at least one-third of the ammonia scrubbers and all that goes with them. Other workers are investigating the question of liquor strength to which gas undertakings can economically work; but there is a difficulty (as pointed out by Mr. Parrish) in adopting Dr. Smith's suggestion. It is a trouble that has been found by gas-works that utilize the direct system for the absorption of ammonia. Interposing the acid catch between the scrubbers and the purifiers, souring would probably be caused in the purifiers, with consequent formation of sulphate of iron, thus interfering with the efficiency of the purifiers. This does not mean that it would be impossible to use an acid catch; but there is a difficulty for consideration and investigation.

Where Apathy and Ignorance Should not Exist.

THE report of the Chief Inspector of Factories and Workshops is not on this occasion a very luminous document. It is not by any means his fault. It is the fault of circumstances; and those circumstances are that trade was bad, depression was over industry, employment was at low ebb, and so conditions were not favourable to developments. Thus there is little progress—little that is new to impart an interest to that which, in the circumstances, is more or less commonplace. Among the things that strike one in the report is the inertia that has such large being in industry in respect of the making of those improvements in working conditions which have material advantages in regard to output, and are protective to employees. Another thing is the lack of the knowledge which should direct factory and workshop owners to a correct selection in making changes.

There was during the year a decrease in the number of accidents recorded; but this is due, not to any improvement in conditions, but to industrial stagnation, to fewer people being employed, and to short-time working. To realize betterment in certain conditions, the inspectors in many cases have to constitute themselves an impelling force, or use whatever persuasive powers they possess to the best advantage. We see this first in connection with the adoption of adequate safeguards for moving machinery. The change has not general application; but all too frequently it could be fairly made. The inspectors are devoting more critical attention to this matter, and particularly to types of machines that have in the past proved dangerous. Safety in this respect can only be secured, not so much by protective application to that which is obviously dangerous, but by, through a careful study of detail, finding out where other danger lurks, and making provision for defence against it. Progress is admittedly being made in this direction; but it appears to be very slow work. The report speaks of "passive interest" in the matter on the part of many employers; and that the interest is not something more than "passive" is attributed to the condition of trade. There is modesty and courtesy in the reason; but trade was not always in the present state. Other reasons for "passive "interest" could no doubt be found—if sought for.

There is another matter—that of lighting. In this, the statements in the report suggest, there is both a languid interest and a great deal of ignorance prevalent. One section of the report deals with health and sanitation. In it we are told that many of the inspectors express surprise at the little interest manifested by employers in this important subject. This is astonishing, in view of the facts that "good" lighting facilitates work and output, prevents accidents, and is an excellent safeguard to the organs of vision of the employees. Eyes ought to be protected from injurious lights—lights of excessive intrinsic brilliance, and lights too poor in power—just as much as the employees should be safeguarded from moving machinery. One inspector makes the sweeping charge that it is not usual to find an entirely satisfactory system of lighting; and others speak of insufficient lighting at dangerous points. In this section of the report, it is stated that gasfilled electric lamps are now obtainable in smaller sizes; and these should help towards better distribution of illumination. Then it is pointed out that screening of intense lights still needs great attention. That is true. But why use these intense lights, when incandescent gas-lamps of lower intrinsic brilliance can be utilized, giving altogether a better distributed light, with less glare at the source? It seems to us that the factory inspectors, as well as the owners of factories, might well make a study of the science of lighting, and find out what is best applicable for efficient service in different circumstances. For example, we turn to the chapter on underground or basement workrooms. The writer there mentions that, in 71 p.ct. of the basement workrooms within her survey, electric light only is used for illuminating purposes; and this shows to what a great extent in such places gas is being superseded. But from what is said, it is clear that indirect

lighting and obscuring of filaments are matters of only incipient growth. In many cases, too, much glare is reported, and lamps of this type are found unscreened and yet placed close to the heads of the workers.

This point may be dealt with in association with another. It is stated that, in only about 4 p.ct. of the basement workrooms, the lighting appeared to be insufficient for the purpose required, and in nearly all these cases gas was the lighting medium. The difference between 71 and 100 p.ct. is 29; so that 25 p.ct. were adequately illuminated by gas. In an earlier part of the report, it is also said that there is a great prevalence of old-fashioned gas-burners, which are not economical. In all these cases, greatly improved lighting could be obtained without any additional cost by the adoption of modern gas-saving incandescent burners; and the economy effected would soon wipe out the cost of making the change. We say frankly that much of this is an indictment, without express statement, of the apathy and want of enterprise that exist in the trading work of some gas undertakings. It proves to us conclusively that public advertisement requires to be supplemented by personal touch. Why is it that 71 p.ct. of the basement workrooms referred to are fitted with electric lamps of high intrinsic brilliance, and the eyes of the workers are daily tortured by them, to their permanent injury? There is first and foremost the indifference of gas suppliers; and, secondly, there is the want of knowledge of the factory owners, and, without offence may we add, of the factory inspectors. In basement workrooms a good quality light, and of lower intrinsic brilliance than incandescent electric lamps is required, and a light that is economically furnished. Incandescent gas-lamps possess all these virtues. What is more, if applied properly in the basements, they can be made good ventilating agents, which is more than can be done with an electric lamp. These are all elementary facts that can be demonstrated in practice; but there abounds a wonderful ignorance concerning them, and, unfortunately, where ignorance should not exist.

The Cooker Specification.

IN the last two issues of the "JOURNAL," publication has been given, *in extenso*, to the report on gas-cookers of the Standardization Committee of the National Gas Council; and to-day we begin the publication of the specification itself. The report gave the reasons for the recommendations of the Committee; and the specification puts into definite form the constructional details, dimensions, burner consumptions, &c. We have previously said that the work of the Committee has been well done. To that statement we adhere. There are no doubt points in detail upon which those who are concerned in the manufacture of gas-cookers have personal preferences which perhaps do not wholly coincide with the recommendations of the Committee. But it should be remembered that the purpose of the Committee was not to start out on the design *de novo* of a gas-cooker. They had many things to consider—not the least being existing conditions and practices. It is clear that the cooker they propose for standardization is in its parts one which can be produced with a relatively small amount of change on the part of the manufacturers. It also allows a large degree of latitude in the matter of conversion of existing types, to bring them as near to the standard as possible, with the view of raising economy and efficiency, to the benefit of the user. The public interests have been studied as well as those of gas undertakings and manufacturers; and, in making such a wide survey, naturally there may be points that, from personal fancy, may be the subject of criticism. The report has now been in circulation some weeks; but from no responsible manufacturers has adverse criticism emanated. Their feeling, we believe, is that the report attests that they have of late years been on the right lines in making developments; and that, as there is no compulsion for gas undertakings to adopt cookers constructed in every detail according to the Committee's specification, there will be a greater disposition to adopt cookers that approach closely to the defined type, and that can demonstrate equal efficiency. At the same time they do not overlook the fact that the Standardization Committee is an influential body, that the National Gas Council represent between 90 and 95 p.ct. of the total gas output of the United Kingdom, and that there is a very general desire on the part of gas suppliers that the prices of appliances shall be reduced still further by the reduction of initial costs through mass production, and maintenance charges by the availability of a large range of interchangeability. There is bound, therefore, to be a considerable demand for cookers constructed in conformity with the specification, although we do not for one moment think that existing efficient types will lack custom. But inefficient types must go in face of this specification; and it will be to the interest of the gas industry that they should do so. Every maker will be free to construct in accordance with the specification and the master patterns; and this is a matter about which they will be anxious to know more, and as early as possible.

Further Reduction of Railway Rates.

THERE may be quite good reasons for discontent over the amounts of the reductions that are made in railway rates; but we are among those who look upon them as something gained, which to the extent of the gain brings us so much nearer the goal of transport charges which it is hoped will in time be realized. At the same time there is a great deal to be said on the side of those who are discontented; and probably much of equal weight could be advanced on the part of the railway companies. Last week a further concession was made by the railway companies, as a result of negotiations with the Federation of British Industries, but in which, it should be marked, the Mining Association (who have been exercising strong pressure on the railway companies) took no direct part. The concessions take effect from Aug. 1; and the Federation of British Industries have agreed to take no part in any application for a general alteration to come into operation before July 31 next year. The Mining Association have absolutely dissociated themselves from the agreement, and will continue to exert pressure to bring about what they regard as more equitable rates for the carriage of coal.

The settlement provides for a general reduction on merchandize traffic by goods train, so that the rates and charges for the traffic will be 75 p.ct. above the rates in operation on Jan. 14, 1920, in place of 100 p.ct. above such rates—this to apply both to class rates and exceptional rates. All concessions by which any rate charge, &c., has already been reduced to a figure less than 75 p.ct. above the corresponding rate on Jan. 14, 1920, will remain unaffected by this settlement. The flat rate increases are to be reduced as follows: 1s. to 6d., 9d. to 4d., and 6d. to 4d.—the 3d. flat rate being unaffected. The rate for smalls is to be reduced from 150 to 100 p.ct. above the rates in force on Jan. 14, 1920. This settlement is not to affect the question of merchandize carried by passenger train, nor any present or future negotiations relating thereto. In the details of the reductions, it is seen that, in regard to coal, coke, and patent fuel, the percentage increase is to be further reduced from 75 p.ct. to 60 p.ct., with the flat rate to be lowered from 3d. to 2d. per ton, and the maximum addition to remain at 3s. 6d. per ton (3s. per ton where now applicable to be retained).

As already indicated, the Mining Association are very dissatisfied with the agreement. We quite concur with the suggestion that it does not meet the requirements of industry; and it may well be described as an inadequate contribution towards the removal of the country's economic difficulties. But it is an addition to what has gone before. It is better than nothing; and it is a help. The colliery owners judge the railway companies from what they regard as their own self-sacrificing attitude. They say they have at great sacrifice re-established their industry on an economic basis; and they feel that the railway companies have not availed themselves to the full of an opportunity to follow a lead which might, with advantage to the nation, have been initiated by transport. The colliery owners present one strong point against the railway companies. They are now getting coal at not more than 40 p.ct. higher than the pre-war price; and yet the railway charges for the transport of coal to other consumers still remain at 70 p.ct. higher than the pre-war rate when the new concessions take effect from the beginning of next month. The agreement does not affect the Scottish railway companies; and the Scottish collieries are therefore much exercised as to their position.

Cheaper Money.

The Bank rate, after only a month at 3½ p.ct., has been reduced to 3 p.ct. The last day on which previously a 3 p.ct. rate ruled was July 30, 1914. Whether the percentage will go lower still will no doubt depend on the position of trade—at any rate, it cannot now be said that dear money is holding-back enterprise. Opinions differ as to the effect upon trade; but,

generally speaking, the availability of cheaper money is something for which industry will be generally thankful—the trouble is that so many businesses have not the scope at present to make use of more money. The lower Bank rate must, however, tend to assist in trade revival.

Gas Workers' Wages.

Under the sliding-scale agreement entered into on Oct. 26, 1921, a reduction was due to take place on July 1 amounting to ½d. per hour; but at a meeting of the Joint Industrial Council on June 22, the Trade Union representatives put forward arguments in favour of a postponement of the decrease. After careful consideration, the employers agreed to the concession, and to make the reduction apply as from Aug. 14. Therefore, on and from that date wages will be reduced by ½d. per hour. This reduction carries, in the case of undertakings entitled to deduct it, the 12½ p.ct. or the 7½ p.ct. bonus in respect of workmen of 21 years of age and over.

Special Orders and Opposition.

It looks as though more latitude is to be provided for opposition to Special Orders proposed to be granted under section 10 of the Gas Regulation Act. The Lord Chairman has given notice of a new Standing Order, providing that petitions against a Special or Draft Order may be deposited on or before the seventh day after the day on which the Order has been laid before the House. Petitioners would then be allowed to appear and to oppose as in the case of a Private Bill. The minutes of the Central Executive Board of the National Gas Council state that an opposed Special Order will be referred to a Joint Committee of both Houses, or a Select Committee of five. The new Standing Order would also apply to Orders under the Electricity Supply Act, 1919.

Gassing Accidents in Industry.

In the annual report of the Chief Inspector of Factories and Workshops, all gassing accidents seem to be described as carbon monoxide poisonings. The fact remains that with the tremendous use of gas there is in the industries of the country—producer, blast-furnace, and other crude gases with a very high content of carbon monoxide—in a whole twelve months there were only, out of 77 gassing mishaps, fourteen deaths ascribed to carbon monoxide poisoning. Of the fourteen deaths, two were due to blast-furnace gas, three in connection with power-gas plants, one due to coal gas in a gas-works, three to coal gas in other works, and five deaths were attributed to other sources of carbon monoxide. Looking at the sources of "carbon monoxide poisoning," neither the quantity of gas used nor the carbon monoxide content appears to have had very much to do with the number of deaths—five deaths being caused by blast-furnace and producer gases with their high carbon monoxide content, and four to coal gas with its much lower carbon monoxide percentage. The figures are all in connection with industry where use is less refined than in domestic service. In our "Electricity Supply Memoranda" next week, reference will be made to the section of the report dealing with electricity experiences.

The Shortening of "Summer Time."

The Early Closing Association and local authorities throughout the country are strongly opposed to the reduction of the period by the Government in the Summer Time Bill for next year. An appeal has been made to the Home Secretary to withhold the measure from Royal Assent, until an expression of opinion has been obtained from the country. The Bill is now regarded as very unsatisfactory; and if it receives Royal Assent, it is proposed that steps shall be taken to bring in an amending Bill. The Association are going to continue a campaign to gain the co-operation of influential authorities in the attempt to make permanent the period that applies to this year.

Obligations of a Gas Consumer.

A gas consumer was summoned recently at the North London Police Court for the non-payment to the Gas Light and Coke Company of £6 9s. 4d. for gas consumed at a house during the December quarter. He denied liability, stating that he had given up possession of the house two years previously. The Company produced a contract which this erstwhile tenant of the house had signed, by which he bound himself to pay for gas consumed on the premises, by himself or any other persons, until notice in writing had been given to the Company requesting them to discontinue the supply to him. This is in accordance with the Gas-Works Clauses Act, 1847, and quite in keeping with commonsense and equity. Apparently the Magistrate at the North London Police Court does not think so, nor does the writer of a very curious article in the "Daily Sketch." The Magistrate stated that he would never sign a contract like this; the writer in the "Daily Sketch" said the consumer who had neglected to give notice in accordance with his contract had commonsense on his side, while the Company had the law behind them. Let us see.

Considerations.

The law imposes obligations on the Company, as well as on the consumer. The Company are bound to supply gas to a householder, unless he is indebted to them, or there is some other reason within the legal limits for refusing to supply. The consumer gets his gas on credit. He consumes as much as he likes; and he is not asked to pay for it until the termination of a definite period. There are millions of gas consumers in the country. Gas undertakings have no means of keeping a check upon their movements. They may sub-let their houses; and the gas suppliers may have no knowledge of this, unless informed. If they are not apprised of the change, gas consumption on credit will continue under the old contract. The only person who could enlighten the gas suppliers as to any change is the person who signed the original contract. On doing this, the gas company would naturally disconnect the supply, unless the new tenant signed a contract on his own account. Will the learned Magistrate or the narrow-minded writer in the "Daily Sketch" inform us how gas suppliers are to keep straight in their business methods, unless there is compliance with obligation not only on their part, but on the part of the consumers who obtain on credit a continuous supply of a commodity the other side of the closed doors of their houses? Supposing all the consumers refused to comply with this obligation as to notice, what would be the position of the Company? And naturally all losses incurred through non-compliance would fall upon the other consumers. This is an instance in which the law has commonsense on its side; and so most people will agree who examine with broad-mindedness the question from all points of view, and have regard to the intolerable position of gas suppliers if notice of removal or termination of contract is not given by the consumers. Gas undertakings cannot do business in the dark. There must be system. The person who appeared at the North London Police Court has deservedly had to pay the penalty of his carelessness in not complying with his obligations, which would have relieved him of all responsibility.

UNIVERSITY OF LEEDS.

CORBET WOODALL SCHOLARSHIP.

As has already been announced [*ante*, p. 87], this scholarship, tenable at the University of Leeds by a student of Gas Engineering, was awarded to Mr. William H. B. Hall. Special circumstances have, however, arisen which make it impossible for Mr. Hall to be certain of taking up the work of the scholarship next October; and he has therefore felt compelled to resign it.

The scholarship has accordingly been awarded to Mr. Alexander G. Grant, of St. Ives. Mr. Grant received his school training at the Nuneaton Grammar School and the Penzance County School. In 1921 he obtained First Class Honours, First Division, in the Oxford Local Senior Examination, with distinction in Physics, a result which entitles him to exemption from the matriculation examination of the Northern Universities. Mr. Grant, who is the son of the Engineer and Manager of the St. Ives Gas-Works, has had short vacation experience at Nuneaton and St. Ives Gas-Works.

Waning Natural Gas.—The waning natural gas supply at Ashtabula (Ohio) is causing alarm; and it is felt that, unless some provision is soon made to obtain an adequate supply of manufactured gas, there may be much suffering in the city next winter. The natural gas supply is daily growing less; and unless some new fields are opened-up (which is considered to be very doubtful), the supply will soon end. The provision of a gas manufacturing plant on modern lines would, of course, get over the difficulty.

PERSONAL.

Mr. L. J. WARREN, Manager of the Manchester branch of George Wilson Gas-Meters, Ltd., has now been appointed General Manager of the Company.

Mr. A. F. CAMPBELL, F.I.C., of Messrs. Hardman and Holden, Ltd., has been admitted to the degree of Doctor of Science in Chemistry of the Manchester University.

Mr. J. FERGUSON BELL, M.Inst.C.E., who for the last twelve years has acted as Consulting Engineer to the Sutton Gas Company, has resigned this position, and has been elected to a seat on the Board.

Messrs. Guest and Chrimes, Ltd., of Rotherham, inform us that their Secretary, Mr. T. W. BOTTOMS, retired at the end of last month, after 42 years' service with the firm, and has gone to reside at Woburn Sands (Beds.). The best wishes of all go with Mr. Bottoms, who is succeeded by Mr. A. L. GUILMANT (Chartered Secretary).

At the opening of the recent Annual General Meeting of the German Gas Association, Herr ERNST KÖRTING, whom many English gas men will remember in connection with his loyal service to the Imperial Continental Gas Association before and during the war, was elected to Honorable Membership of the Association—a much-coveted and rare distinction in the German gas industry.

The vacancy on the Board of Directors of the Gas Light and Coke Company, created by the death of the Rt. Hon. Sir Daniel Ford Goddard, P.C., has been filled by the election of Mr. HAROLD B. HARTLEY, M.A., C.B.E., M.C., Fellow and Tutor in Natural Science of Balliol College, Oxford, Chairman of the Board of Faculty of Natural Science in the University of Oxford, late Assistant Director of Gas-Services at General Headquarters, and Controller of the Chemical Warfare Department of the Ministry of Munitions.

OBITUARY.

The death occurred at Hastings, on the 6th inst., after a long and painful illness, of Mr. A. R. THOMAS, late Superintendent of the Gas-Works, Malta.

The death has taken place of Mr. W. W. PEATTIE, the Manager of the Dunblane Gas Company. He several years ago carried through a complete reconstruction of the Dunblane Gas-Works.

We regret to record the death, on the 3rd inst., after a lingering illness, of Mr. JOHN SOUTHCOTT, Resident Manager to the Westbury Gas and Coke Company, Wilts. He entered the service of the Company in 1891 as a gas-fitter, and a year later was entrusted with the entire charge of the fitting and distribution department. Subsequently he was appointed to the above-named position, which he held so long as health permitted, to the entire satisfaction of all concerned. The esteem with which he was regarded in the district was evidenced by a large attendance at the graveside. This included the Directors and the whole of the staff, together with many prominent residents. At a meeting of the Directors held on the 17th inst., his son, Mr. MAURICE SOUTHCOTT, was appointed as his successor.

LEEDS UNIVERSITY EXAMINATIONS RESULTS.

June, 1922.

HONOURS IN GAS ENGINEERING.

First Class: R. A. Mott, S. Pexton.

HONOURS IN FUEL AND METALLURGY.

Second Class: W. S. Patterson.

FINAL B.SC. TAKING GAS ENGINEERING AS PRINCIPAL SUBJECT.

R. Dally	R. C. Taylor
G. L. Sharpe	H. H. Thomas
N. S. Smith	P. Wedgwood

FINAL B.SC. TAKING FUEL AND METALLURGY AS PRINCIPAL SUBJECT.

E. Carrington N. Greenwood A. H. Smith.

An Old Gas Well.—The oldest gas well in Arkansas, after standing open for 33 years (for many of which it has apparently been full of water), has continued to yield gas; and quite recently the water has disappeared. A continuous flow of gas through the water was the subject of considerable speculation when the well was "re-discovered." The well has been remarkable in many ways. It was for many years the deepest west of the River Mississippi. It was the first well in Arkansas or Oklahoma to produce oil; but the oil was considered of no value, because it contained too much gasoline and naphtha, which in those days were not in demand. Where the water came from, and where it went, are questions still to be answered.

ELECTRICITY SUPPLY MEMORANDA.

THE Electricity Supply Bill has undergone some amount of amendment in Standing Committee C; and the measure as modified has been printed.

The Amended Bill.

The amendments that were proposed in Committee were many and extensive, and had any substantial part of them been agreed to, the Bill would have lost all semblance to itself as it emerged from the House of Lords. As a matter of fact, the modifications are not extensive, but for the most part they are intended to be protective to ratepayers, as were those that were made by the Lords. In connection with the main clause which confers on the Joint Authorities power to borrow, one of the purposes for which they may borrow is for work the payment for which ought, in the opinion of the Electricity Commissioners, to be spread over a term of years. The money borrowed for such purposes, it is proposed, shall be also utilized for the payment of interest on the capital expended while it remains unremunerative. This would have been, standing thus, an open sanction to pay interest from capital, so long as, by any stretch of the imagination, it could be said that the money was unremunerative. But this has now been altered, by the addition of the words "but in no case for a period of more than five years from the commencement of the financial year next after that in which such expenditure commences to be incurred." Another amendment has been made which is intended to put a greater control over the borrowings of the joint authorities. A scheme constituting an authority shall fix, with reference to the estimated capital expenditure, the maximum amount which may be borrowed, and "the authority shall not have power to borrow any sums in excess of the amount so fixed, otherwise than for the purpose of paying off loans previously raised, unless authorized by an order of the Electricity Commissioners, confirmed by the Minister [of Transport], and such order shall be provisional only, and shall not come into force unless confirmed by Parliament." This means that any extra borrowing must be (1) authorized by the Electricity Commissioners, (2) confirmed by the Ministry of Transport, and (3) confirmed by Parliament. This will ensure absolute oversight by Parliament in the interests of the public. In one or two cases, advisory bodies have been set up, instead of joint authorities. In clause 5, which empowers financial assistance by supply undertakings and local authorities (which is financially altogether wrong, they having themselves to borrow money), there is now recognition of bodies other than joint authorities in sub-section 4. This provides that "a scheme under the principal Act constituting a joint electricity authority or other body for the improvement of the organization of the supply of electricity in any electricity district may include provisions authorizing or requiring authorized undertakers, and authorizing companies and other bodies, represented on the authority or body, to contribute towards any administrative expenses of the authority or body." There are other amendments; but they are not of any great significance so far as we are concerned. The stand-by clause which it was thought required amendment, and the power to railway and tramway authorities to do business in surplus energy remain unaltered in the Bill. The surplus energy referred to can be supplied (1) to a joint electricity authority; (2) to an authorized undertaker; or (3) to any consumer, subject, in the case of premises situate within the area of supply of an authorized undertaker, to the consent of that undertaker. No. 3 is the objectionable feature. It is true the consent of the Electricity Commissioners has first to be obtained; that the railway or tramway authorities cannot supply to any authorized distributor whose undertaking is in the area of a power company without the consent of that company; nor can they supply any premises within the district of a joint authority, and not within the area of any other authorized undertakers without the consent of that authority. Some of the supporters of the Bill think it has been unnecessarily mauled about.

The Inability to Pay.

As frequently observed of late, the electricity industry is busy trying to find ways of inducing householders of the artizan class to adopt electricity. While they are doing this, wages are falling to something approaching the pre-war level; but rents and electricity are not in that neighbourhood yet. We see that a representative of the "Evening News" has been told by an official of a large suburban firm of electric-lighting contractors that "electricity is fast finding its way into the houses of the workers." In the area concerned, it is stated that "May was a record month for the number of installations made. Practically every new house, even of the smallest type, is wired for electric installations, and few people prefer gas. At the rate we are going, it will not be many years before houses without electric light will be the exception in this part of outer London." This shows a magnificent optimism. Much may occur to shatter it before very long. Experience tells. There has been experience at Aldershot. We cull our information from the "Electrical Review." It is highly interesting as being the true experience with working men who are supposed to enjoy electric lighting, and are willing to pay for it. Supposition and fact do not harmonize in Aldershot experience. There have been several cases before the Magistrates in which working men were the defendants. They were sued for money

owing for electric lighting. High rents and low wages were the untenable excuses for not paying for the light. In one case the amount due by a man named Sullivan was £4 os. 2d. When Sullivan entered into occupation of the house, he was under the impression that light would be supplied for 1s. a week, payable with the rent; but after a few weeks he was surprised to receive an account for £1 odd. He eventually agreed to the current being cut-off, because a wage of £3 10s. (when at work), with a wife and eight children, and a father-in-law and a widowed mother to assist, together with a rent of 17s. 4d. per week, would not permit him to run up electric lighting accounts. The Magistrates had no option but to make an order for the payment of the amount, with 5s. 6d. costs—leaving it to the collector to arrange how the money should be paid. Another man—A. A. Kinnear—was summoned in respect of an account for £1 8s. 2d. Defendant said his wages were £2 12s. 6d., less stoppages due to wet weather; and his rent was 17s. 4d. He was ordered to pay within six weeks. J. R. Kavanagh, who owed £2 4s. 10d., was ordered to pay, with 5s. 6d. costs. He wrote that he was paying 15s. 9d. in rent, and 3s. weekly off arrears. His wages were £2 10s.; and he had to keep himself, his wife, and four children. Similar orders were made against W. Price, owing £1 5s. 2d., and T. R. Evans, owing £2 11s. 6d. Yet, with wages going down, some electrical men talk of all-electric houses for the working classes. Commonsense seems to be a waning quantity in some quarters.

Coal Heating the Line of Least Resistance.

The "Electrical Times" has been describing the Manchester Health and Home Exhibition. It commences the story by saying: "Science is daily demonstrating how the humdrum of life can be made easier—not to say happier. But the difficulty up to now has always been to convince people that they have it in their power to take things easier, if only they would set out to help themselves." This difficulty has not been found by the gas industry; and it has not been found that people have been slow to help themselves to those labour-saving gas appliances which make things so much easier for them. According to our contemporary, the Electricity Department of the Manchester Corporation is out to show the people of the city and the environs that they can save themselves a great deal of labour by changing over from gas to electricity for lighting, heating, and cooking purposes. We do not for a moment take our contemporary seriously. The Electricity Department would have considerable trouble to show that people could save "a great deal of labour" by changing over from gas to electricity. It would be a far easier job to show that much labour would besaved by changing over from coal to electricity; but the mass of the people would have to pay considerably more for the electrical agent. It is really ridiculous for our contemporary to write and publish such nonsense, for it is nothing more. The fact that people have not so far been persuaded that electricity is superior to gas as a heating agent is shown a little further down in the article. There we see that, while there are thousands of gas-cookers in use in the city, there are not more than 90 electric stoves or cookers. Because of this, and of the generating capacity of Manchester, the electric-cooker is being "boomed" by the department. However, as we read on, it appears that it is coal and not gas that the department are out to displace, which is rather more sensible. We read that the electric-cooker appeals irresistibly to the housewife who knows the discomfort of preparing meals on a coal-range in hot weather, the dirt and work caused by fuel and ash and flue cleaning, and the worries of bad draught and poor coal. The department are also making a special effort to persuade the public that electric-radiators have many advantages over coal-fires. All this is perfectly legitimate; but the public are free to make a selection from the labour-saving appliances offered to them. The superior adoption is on the side of gas, and in this indisputably there is public wisdom.

The Storage of Heat.

Some of the men in the electricity supply industry have got the heat-storage problem very badly on the brain. They are struggling hard with something that is highly complex; and they see no way out of it, but that of heat storage—not at the generating end, but on the consumers' premises. It is the surplus capacity of the generating stations at certain periods of the day that it is desired to put to use, so that the average of the capital and other general charges may be brought down, and an all-round reduction be made in the price of electrical energy. The writer tells us that there is, in the existing power stations of the country, a capacity for providing three to four times as much electrical energy as is utilized in a year. Now this surplus capacity is due entirely to the necessity for having generating plant sufficient to meet the peak loads, and a margin of safety upon that. Storage at the station is not commercially practicable, save to a limited extent; and so there is a growing desire to distribute among the consumers the cost of storing surplus energy. We rather think this is doomed to failure on account of the limitations and expense of all the systems proposed. We saw recently the suggestion to accumulate heat on consumers' premises by electricity supplied during the night; the resulting heat being stored in a suitable medium, over which air would be passed, so becoming heated, and then discharged as required into the room or other place requiring warmth. But, of course, this would only be applicable to winter. The other proposal is the provision of hot water, by employing immersion heaters in a water-storage tank; the electricity being allowed to trickle in through the hours of low load during the twenty-four. We have frequently discussed this proposal, which has disadvantages that would sicken most householders who are accustomed to obtain a plentiful supply of hot water, as and when required, by gas-heated appliances. The quantity of current passing being regulated and constant, it would obviously be easy to make a fixed charge for the indifferent service. But the writer in the "Electrical Times" suggests that a simple method of charging for the energy consumed in any individual tank would be to measure the quantity of hot water drawn-off (for which purpose an inexpensive meter could be produced), and to charge 1d. for a specified number of gallons. Assuming, he says, an initial water temperature of 50° Fahr., a final temperature in the tank of 150° Fahr., and an over-all thermal efficiency of 75 p.ct., some 5 gallons of hot water for 1d. would be obtained, if the tariff was ½d. per unit. There are not many undertakings which would be prepared to supply at ½d. per unit, even assuming the electrical energy is regarded as a bye-product. Electrical engineers have produced many schemes with the object of developing domestic electrification; but they are still wrestling with the problem. We rather think this latest craze for heat storage will not fill the bill any more than have many other schemes, seeing that better service can be secured by other means. The revival of old schemes, and the development of new ones, supply the best evidence of the real difficulties of the problem.

Water-Heating Fallacies.

The "Electrical Review" also publishes an article on "Electric Water-Heating for Domestic Purposes." This is by Mr. G. H. Wood; and the contribution briefly describes the electric-geyser, the heat-storage system, and the combination system. The writer admits that "the want of some electrical method of heating water for domestic purposes is a great handicap to the progress of electric cooking." Notwithstanding this, he asserts that, while it is perfectly true the electrical method is not at present practicable for heating very large quantities of water—such as are required in hotels, boarding-houses, &c.—"yet, for the average middle-class household, electric water heating is a sound and practicable proposition." The two statements appear to be somewhat out of joint. The writer expresses some strange views which do not conform with experience or fact. He says the idea that gas is necessarily more economical than electricity for water-heating is largely a fallacy; for, although one can buy more B.Th.U. in gas than in electricity for a penny, the superior efficiency of the electrical method goes a long way to offset the difference in price of the heat energy. What does he mean by the superior efficiency of the electrical method? A well-designed gas-geyser will give an efficiency of 90 p.ct.; and the thermal efficiency of a gas circulating-boiler, having regard to the whole hot-water system, is about 50 to 60 p.ct. Can any electrical method do better than that? We think not—in fact, we know it cannot. Losses of heat in utilization are not confined to heat generated by gas. However, the writer asserts that in practice electricity at 1½d. per unit can favourably compete with gas at 4s. 6d. per 1000 c.ft. Mr. Wood's information is sadly lacking in veracity. The expenditure of 1½d. on electricity would provide 3420 B.Th.U., which, utilized at 90 p.ct. efficiency, would only mean the transfer to the water of 3078 B.Th.U. The 1½d. would purchase 28 c.ft. of gas, which, at 475 B.Th.U. per cubic foot, would give potential energy to the extent of 13,300 B.Th.U. This, utilized at 90 p.ct. efficiency, would mean the transfer of 11,970 B.Th.U. to the water. With gas it would be necessary to get under 24 p.ct. efficiency to equal electricity on the basic figures suggested by Mr. Wood. We do not think it is necessary to comment further upon the article, except to say there is a perfect host of people in the country whom Mr. Wood must find it impossible to excuse. He remarks that "the use of gas in a room devoted to personal cleanliness, such as a bath-room, is inexcusable where electricity is available at reasonable rates." We do not suppose that Mr. Wood's view will in any way lessen the use of gas in bathrooms with well-fitted and ventilated geysers. We are a bit surprised, however, that the "Electrical Review" did not exercise its blue pencil a little before publishing this article.

Tar Distilling.—We regret that again this week there is unavoidably held over the abstract of the paper by Mr. W. A. Walmsley, of Glasgow, on "Tar Distilling," and the discussion which took place thereon at the annual meeting of the Society of Chemical Industry.

Losses from Gasholders.—With the object of drawing-up standard guarantees for gasholders, the German Gas Association, we learn from "Das Gas- und Wasserfach," are endeavouring to satisfy themselves as to what are the permissible limits of losses of gas from holders. They have found that no statistics on the subject exist, and leading men in the industry have given their opinion, in reply to inquiries, that holders should be absolutely gas tight. But it has been thought desirable to collect facts and figures, as instances have been quoted which show that considerable leakages do actually exist in new as well as old holders. A standard for measurements is being worked out, from which a good idea of the general state of affairs in this respect should be obtainable.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A meeting of the Central Executive Board of the National Gas Council was held on Tuesday, the 11th inst., at No. 30, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair.

CORPORATION PROFITS TAX.

It was reported that the amendments referred to at the last meeting of the Central Executive Board, which aimed at reducing the period of exemption of public utility undertakings from the above tax from three years to one year, and also at taxing gas undertakings upon the profits from their ancillary businesses, were not adopted, and that the Finance Bill had passed through the Committee stage without these amendments. The period of exemption of public utility undertakings from the payment of Corporation Profits Tax continues, therefore, for a further three years.

SAFEGUARDING OF INDUSTRIES ACT (Part II.)—GAS-MANTLES.

It was reported that, in accordance with the resolution passed at the last meeting of the Central Executive Board, evidence was submitted on behalf of the Council at the hearing before the Special Committee on the 21st of June. No Order has yet been made.

ELECTRICITY (SUPPLY) BILL.

The efforts made by the Council to obtain amendments to this Bill in Committee were reported. The Bill had been considerably improved since its introduction in the House of Lords. It was, however, disappointing that the proposed new clause, prohibiting the taking of supplies of energy from Government Departments, had been unsuccessful. The Minister in charge of the Bill had undertaken to consider, before the report stage, the two other clauses which required amendment.

SOUTH WALES ELECTRICAL POWER DISTRIBUTION COMPANY'S BILL.

Despite the most strenuous efforts in both Houses, the Council had to report that their efforts to obtain an amendment to clause 14 of this Bill were unsuccessful. The clause in question allows local authorities in the Company's area to subscribe to, and hold ordinary or preference shares or stock in, the capital of the Company, and to lend money to the Company subject to the directions of the Electricity Commissioners and the consent of the Minister of Health. The Council were disappointed at their lack of success, inasmuch as the arguments put forward on behalf of the gas undertakings to the Select Committee appeared to be irrefutable.

ORDERS UNDER SECTION 10 OF THE GAS REGULATION ACT, 1920.

Reference was made to the fact that the Lord Chairman has given notice that he intends to move the insertion of a new Standing Order providing that where any Special or Draft Order is laid before the House, petitions against such Order may be deposited on or before the seventh day after the day on which the Order has bsen so laid, and petitioners shall be allowed to appear and oppose as in the case of a Private Bill.

An opposed Special Order will be referred to a Joint Committee of both Houses or a Select Committee of five, for their report.

This Standing Order refers to Special Orders under section 10 of the Gas Regulation Act, 1920, and Orders under any provision of the Electricity (Supply) Act, 1919.

INTERIM REPORT ON DAMAGE TO FISHERIES.

The conclusions of this interim report were considered—viz., that highway authorities should give a preference to asphaltic bitumen free from tar products, for the treatment of roads draining directly into fishing waters, as there is no evidence before the Committee that washings from such bitumen have any specific deleterious action on fish or other stream life. This is not the final report; and the Committee are still pursuing their investigations.

In the ensuing discussion, the question of the Standard Specification of tar used for road surfaces was also considered; and it was suggested that, in any new standard specification for such tar, a test for viscosity should be included.

A small Committee were appointed to investigate this question.

SMOKE ABATEMENT.

The report of the Fuel Economy Committee to the Production Committee of the Federation of British Industries, upon which the gas industry is represented, was considered with reference to this question. Among the proposals made by the Committee are the following:

(1) That powers should be sought by the Ministry of Health to set up an organization of persons fully equipped by scientific, technical, and industrial qualifications to act whole-time as an advisory body. One person should be appointed to represent the interests of, and act for, each distinct industrial area.

(2) The functions of this advisory panel should be:

(*a*) To advise manufacturers when requested regarding smoke abatement;

(*b*) to investigate complaints by local authorities and others regarding smoke nuisance. All prosecutions under the existing Act should be accompanied by a report from the advisory officer of the area in which the particular offence was committed.

After full discussion, the Board indicated to the Council's representative on the Production Committee the line of action they desired should be adopted.

RATING.

It was reported that further inquiries were being made by the Council with regard to expert advice on this subject, and that negotiations were still being pursued. When the terms had been settled, these would be circulated to each member of the Council for acceptance if such member desired to adopt the scheme.

MODEL BILL.

A meeting of the Committee of the Council dealing with this matter was reported to have taken place on the previous day. The amendments which it is proposed to lay before the Lord Chairman this session were submitted and approved by the Board.

THE NON-BENZENOID HYDROCARBONS.*

Reviewed by E. C. WILLIAMS, M.Sc., F.I.C., Research Chemist to the National Benzole Association.

THE impetus given in this country by war and post-war conditions to the development of the chemical, and particularly the organic chemical, industries, has revealed, among other unpleasant truths, the lack of works in the English language dealing in anything approaching a comprehensive manner with specialized branches of organic chemical science. The bulk of new works published from year to year renders it almost a physical impossibility for most workers to maintain a correct and up-to-date appreciation of any but a small section of the whole position. The annual reports issued by the various chemical societies assist in calling attention to recent progress, but are themselves of too frequent occurrence to provide more than brief and somewhat disjointed comments on the passing literature. It is, therefore, desirable that from time to time, and at wider intervals, some attempt should be made to consolidate the ground, and collect, with a good deal of discrimination, scattered work into as homogeneous a whole as possible.

An attempt in this direction is being made both in this country and in America by the publication of series of treatises or monographs on special branches of chemical science or industry. The subject-matter of many of the monographs published or contemplated reflects the general interest in the manufacture of dyestuffs; and the book under review comes opportunely as a reminder of the enormous field of scientific and industrial importance lying outside the fascinating domain of the benzene, naphthalene, and anthracene hydrocarbons, and their derivatives.

This particular monograph is neither purely scientific nor purely industrial, but a fusion of the two with a strong leaning towards the former; indeed, it may be said to be almost solely a survey of the scientific side of the subject, in which the author has not hesitated to go to industrial sources for any reliable information which can be obtained therefrom.

The fact that the chemistry of the non-benzenoid hydrocarbons has not been so fully developed as that of the aromatic series is, perhaps, due to some extent to the fact that the demands of industrial application in this field have not called so insistently for pure chemical research work, or indeed for works practice of a very high degree of chemical precision. It is now generally admitted, even by the purists among chemical workers, that industrial practice, both by the provision in quantity of complex products which might otherwise be rarities of the laboratory, and also by the suggestion of problems for attack, has proved in the past of great value to the progress of chemical knowledge; and it is therefore unfortunate that industrial practice, in the case of open-chain non-benzenoid hydrocarbons at least, has been concerned mainly with the production of substances to be burned or eaten. Furthermore, it appears that the internal combustion engine is almost as adaptable with respect to what it can consume as the digestive system of a human being. Even in the case of rubber (upon the synthesis of which for a considerable number of years the finest chemical skill has been expended), the *sine quâ non* is to produce not so much a chemical entity as a substance which shall behave like the natural product under tests which are not chemical.

In the petroleum industry, however, a knowledge of the underlying fundamentals is becoming more imperative, as a generous Nature is proving unequal to the demands upon her. It is to be hoped that the need for a greater output of motor spirit and oil than Nature has hitherto so lavishly provided, and for more economical methods of treating that which is provided, will lead to a thorough and exhaustive examination of the chemical reactions involved, to the advancement of the chemistry of the non-benzenoid hydrocarbons, and the benefit of the industry at large. What the late Sir Boverton Redwood has described as "The brutal process of sulphuric acid refining" for the removal of undesirable constituents from mineral oils—a process which, be it noted, has not since its inception more than half-a-century ago been improved upon nor even examined from the scientific point of view until quite recently—will surely have to give way to some more scientific and less drastic treatment. The wholesale removal of

* The Non-Benzenoid Hydrocarbons, by Benjamin T. Brooks, Ph.D. Published by the Chemical Catalog Company, New York, 1922. 612 pages.

unsaturated compounds, incidental to this process, has come to be regarded by many as its main object; and this in spite of the fact that these constituents are not only not inherently harmful to motor spirit, but are valuable motor fuel themselves. Indeed, it has been shown that a motor will run efficiently on a spirit consisting entirely of unsaturated hydrocarbons.

It is not just, however, to ascribe the whole blame for the comparative backwardness of non-benzenoid hydrocarbon chemistry to the lavishness of Nature, nor to the hardiness of constitution of a motor engine or human digestion. The difficulty of obtaining pure chemical individuals from the complex mixtures constituting the natural mineral or essential oils is considerable, in many cases insurmountable; and the history of the chemistry of these products contains many examples of new products being described which have proved on further examination to be mixtures, or of properties being assigned which have proved to be entirely erroneous on account of the non-purity of the product examined. These difficulties are largely peculiar to the chemistry of the non-benzenoid hydrocarbons, and are in marked contrast to the comparative ease with which the various members of the aromatic hydrocarbons and their derivatives can be isolated in a pure state by distillation or crystallization.

This book (as stated above) has a strong industrial interest, especially to workers in the petroleum, essential oil, camphor, and rubber industries. But the reader seeking details of industrial practice will be disappointed; he is admittedly not catered for. The treatment is essentially for the organic chemist; and a fairly wide knowledge of organic methods and reactions is assumed. There is little in the book which is original. The treatment consists for the most part of a survey of the literature up to a recent date; and it is probably in this direction that it will have its greatest usefulness. Dr. Brooks, however, develops a thesis which gives the subject a unity which many treatises on the non-benzenoid, or aliphatic, hydrocarbons do not possess. He "has endeavoured to show the close relationships which hold generally through the chemistry of the non-benzenoid hydrocarbons;" and this argument is particularly attractively developed in his treatment of the ethylene bond, the unsaturated hydrocarbons, and the polymerization of hydrocarbons, which latter is, of course, a function of unsaturation. The author has elected also to treat the important group of cyclohexanes as true non-benzenoid hydrocarbons, along with cyclopropane, cyclobutane, cyclopentane, &c. (to which series they more closely approximate in their behaviour), rather than to classify them as derivatives of the benzene series. In the same way, the hydrogenated naphthalene, anthracene, and indene derivatives are included among the bi- and tri-cyclic non-benzenoid hydrocarbons. The large-scale production of tetra- and decahydronaphthalene as turpentine substitutes in Germany was a feature of war-time industrial progress, and incidentally another example of the transference under considerable difficulties of a delicate laboratory reaction to the manufacturing scale.

The book deals mainly with the occurrence, properties, methods of synthesis, and proofs of structure of the various hydrocarbons, and in my opinion the author has been somewhat led away from his original thesis of demonstrating the unity of his subject by a desire to include a large amount of material, readily obtainable from other sources, which, unfortunately, makes the book in places resemble a catalogue, with corresponding loss to its readableness and to the lucidity of the argument.

To summarize the contents in greater detail. Chapter I. deals with the paraffins occurring in Nature, theories as to their origin, the formation of paraffins by the destructive distillation of organic matter, and standard methods of synthesis. A brief account is given of recent work on the pyrolysis of hydrocarbons and on the polymerization and hydrogenation of unsaturated hydrocarbons by treatment, under pressure and at high temperatures, with and without the presence of contact substances. The use of nickel for the hydrogenation of unsaturated hydrocarbons has so far met with no technical success on account of its susceptibility to poisoning, particularly by sulphur compounds, and to its becoming inactive through deposition of carbon upon its surface. Probably the only catalytic action which shows promise of value in the treatment of undesirable unsaturated and sulphur containing constituents of petroleum oils is that of aluminium chloride. A paper dealing with the use of this reagent in the refining of low-grade motor spirit has appeared recently in the "JOURNAL." It is difficult to see on what grounds patents have been granted so freely in recent years to cover the use of this reagent, as its use for the polymerization of unsaturated compounds and removal of sulphur compounds was known and patented nearly fifty years ago.

Chapter II. deals with the chemical reactions of the paraffin hydrocarbons, oxidation, reaction with sulphur, nitration, sulphonation, and action of halides. The most interesting feature is probably the section on air oxidation, dealing mainly with the work carried out during the past three or four years, with the object of producing fatty acids from high-boiling paraffins, hydrocarbons, and waxes. Those interested in low-temperature carbonization will be intrigued, though not greatly enlightened, by the bald statement that Harries has applied his ozonization method to the highly unsaturated oils obtained in low-temperature carbonization of coal; but no reference, details, or outline of the results obtained are given.

Chapter III. treats a few of the more important paraffin hydrocarbons in greater detail. The industrial production of liquefied methane and ethane from natural gas, arising originally from the demand for helium, suggests the bringing together of several important manufactures—for example, methyl chloride, carbon tetrachloride, chloroform, dichlormethane, ethyl chloride, ethylene, ethyl ether, and ethyl alcohol—to the natural-gas field; and this course is further indicated by the increased demand for methyl alcohol and acetone, and the cheapening of liquid chlorine. An account is given of the development of methods for the chlorination of methane in the presence of various contact substances to methyl chloride, chloroform and carbon tetrachloride, although the most promising method of producing chloroform from methane appears to be an exhaustive chlorination followed by partial reduction of the carbon tetrachloride to chloroform. Little recent work has been done on the corresponding chlorination derivatives of ethane. Attention is also called to the possibility of the reduction of carbon monoxide in illuminating gas and water gas to methane—a subject which is, no doubt, familiar to readers of the "JOURNAL." A brief account of the higher paraffins, their methods of synthesis and properties, follows. The chapter concludes with a special section on the refining of petroleum distillates—a subject on which Dr. Brooks is well qualified to speak, and which will be read with interest and advantage by anyone who has to do with the refining of petroleum and, for the matter of that, coal-tar distillates, for many problems are common to both.

Chapter IV. on the ethylene bond is introduced by a survey of the theoretical conceptions of the nature of the double bond. The Bayer strain theory will probably only receive confirmation in its main principle from the later theories based on present knowledge of valence and atomic structure. In introducing the Lewis Langmuir theory, the author would have been well advised to make use of actual illustrations of the atomic models. Without these the text is probably unintelligible to readers not already familiar with the conceptions involved. However, as Dr. Brooks makes no further use of the theory in his succeeding chapters, perhaps the sidelong glance he gives to it is sufficient. A review of the chief reactions of the ethylene bond follows, in which special attention is devoted to the action of sulphuric acid on unsaturated hydrocarbons of the open-chain and terpene series, and the application of this reaction in the refining of mineral oils. The oxidation of unsaturated derivatives by air and ozone, and addition reactions with sulphur, nitrosyl chloride, &c., are discussed; and finally standard methods for preparation of olefines are summarized.

Chapter V. is devoted to a more detailed description of individual members of the ethylene and aliphatic terpene series; and Chapter VI. to phenomena of polymerization of unsaturated compounds. The classic example of the polymerization of isoprene to rubber naturally claims chief attention; and a historic account is given of the hitherto not very successful attempts to manufacture synthetic rubber in competition with the natural product. It is interesting to recall, in reviewing the methods commercially available for the production of butadiene and its methyl derivatives, that the Fernbach acetone fermentation process so widely utilized during the war was originally developed with a view to the production of normal butyl alcohol, the other principal product of the fermentation, which serves as a starting material for the production of butadiene. A falling-off in the progress of rubber research since the war is noted; but it is surely beating a dead horse to suggest that this is due to previous research having been (in Germany at least) a war preparedness measure. With warfare on the present scale, all chemical research might be so stigmatized.

The standard methods of synthesis of the cyclic hydrocarbons form the subject-matter of Chapter VII.; and a description of the members cyclopropane to cyclopentane with a few of more important derivatives is given. No mention is made of the interesting examples of stereo-isomerism which this ring closing produces.

The cyclohexanes and their derivatives as forming the most important branch of this series are treated separately in the following chapter. Their occurrence, methods of formation, and reactions are described in detail, together with those of the corresponding unsaturated cyclohexenes and hexadienes. Although occurring to a considerable extent in the Russian and Galician petroleum deposits, the difficulty of separating pure individuals from this source makes their synthetic production by hydrogenation or ring closing of open-chain hydrocarbons the only practicable process for obtaining them. The former process, based on the work of Sabatier and Senderens, is now of considerable industrial interest. The author sketches the close parallelism of reaction between the cyclohexanes and the normal hexane series.

Chapters IX. to XII. deal in a similar manner with the cyclic hydrocarbons of the para, ortho, and meta menthane series, and the bi- and tri- cyclic members santene, sabinene, and thujene, with their oxidation products. The bi- and tri- cyclic hydrocarbons resulting from the hydrogenation of naphthalene, anthracene, and phenanthrene, are also introduced here. The fascinating unravelling of the constitution of pinene by the joint labours of Wagner and Baeyer is again described at length, though not with the greatest lucidity. No mention appears to be made of the important contribution of Tiemann and Semmler on the oxidation of pinene. Further sections are devoted to a review of the classic work on the constitution of camphor, and to the present position of the synthetic camphor industry with respect to natural camphor production.

Chapter XIV. continues the review of the cyclo paraffin series, with the members cyclo heptane to cyclo nonane.

Chapter XV., under the title of "Rearrangements," deals with the conversion of cyclic hydrocarbons to cyclic hydrocarbons containing a different number of ring carbon atoms. The mechanism of such rearrangements has been a matter of much speculation. Recent work by Ruzicka is quoted in support of Wallach's theory, which presupposes an intermediate formation of a cyclo propane ring from three adjacent ring carbon atoms, or from two ring carbon atoms and one atom from a side chain. The usual examples are given in illustration of these changes. The remainder of the chapter is devoted to a discussion, with examples taken mainly from the cyclic and bicyclic hydrocarbon series, of the pinacoline transformation.

Chapter XVI., on the physical properties of the non-benzenoid hydrocarbons, analyzes as far as present work permits the influence of constitutional factors—molecular weight, ring closing, unsaturation, &c.—upon physical properties—molecular volume, melting and boiling points, colour and absorption spectra, fluorescence, refractivity, magnetic rotation, optical activity, specific heat, viscosity, solubility, and heat of combustion. The general position with regard to the use of physical properties as an aid to the determination of constitution is, however, in many cases extremely vague; on the other hand, knowledge obtained by chemical methods must usually be employed to explain the vagaries of physical behaviour. In the section dealing with solubility, mention is made of the abrupt miscibility points obtained at definite temperatures with mixtures of paraffins and aniline; and a reference to the recent development on these lines, by Tizard and Marshal, of a method for the quantitative estimation of aromatic hydrocarbons in paraffin-aromatic mixtures would seem worthy of notice, if only on account of its novelty. Under the heading of colloid phenomena, the author deals briefly with the formation of petroleum jellies, petroleum soaps, and oil emulsions. The adsorptive power of activated charcoal for hydrocarbon vapours, and the selective adsorption by such materials as fullers earth of unsaturated and sulphur or nitrogen containing oils, is also given short notice.

Chapter XVII. on the physiological properties of the hydrocarbons is very sketchily done; and we would much prefer to see this replaced by a chapter dealing with the conversion of non-benzenoid to benzenoid hydrocarbons, which, if rather outside the boundaries fixed by the author, is of considerable scientific and industrial importance to many of those for whom the book is intended.

The book ends on an unhappy note in the suggestion that a certain compound may prove even more physiologically horrible than mustard gas, when more data as to its effective concentrations have been acquired. It can only be hoped that Dr. Brooks's efforts will inspire a worthier motive for research.

The format of the book is good, and there are few misprints. By the way, Mr. W. H. Perkin, jun., has not yet been knighted; perhaps the omission will be rectified in time to prevent a correction of a second edition being necessary.

The book is one that can be thoroughly recommended to anyone interested in the chemistry of hydrocarbons, and should certainly be included in all chemical libraries. It contains accounts of a great amount of work of semi-industrial importance which has not hitherto appeared in book form.

Thornycroft Suction-Gas Lorry.

A 3-ton suction-gas lorry, built by Messrs. John I. Thornycroft & Co., Ltd., of London and Basingstoke, formed the subject of an illustrated article in the "Engineer" dated the 7th inst. The necessary steam is produced in a separate generator, which is heated by the exhaust gases from the engine; and as the heat of the exhaust gases must necessarily be in proportion to the power which is being developed by the engine at any load, the correct amount of steam for the producer is provided under all conditions. The steam generator also works in circuit with an auxiliary vaporizer which removes the heat from the gas by conduction before it passes to the dust-collectors and on to the gas cooling and delivery pipe. The producer is designed as an integral part of the chassis; and its weight has been reduced to the greatest extent possible. The delivery of the fuel from the hopper to the producer is effected by the action of gravity; and there are no mechanical movements connected with the apparatus. Within from five to ten minutes of lighting the fire, the vehicle is running on the road. The pulling capacities of the lorry tested by our contemporary were good, and improved as the trial proceeded; while the general flexibility of the engine was all that could be desired. The special arrangements which are made to maintain and supply just the correct quantity of gas when the vehicle is standing with the engine running light, or when coasting down-hill, are the subjects of patents by the firm. With regard to the relative fuel costs when running a Thornycroft lorry of this type on suction gas or petrol, it is stated that, if the price of petrol be taken at 1s. 10d. per gallon and that of anthracite peas at 63s. 11d. per ton, then the cost of suction gas works out at a little below one-third that of petrol. These figures were arrived at as the result of trials with actual vehicles in commercial use doing long and short daily journeys.

The wedding took place last week at Birmingham (Sparkbrook) of Miss Frances Dennett, of King's Norton, and Mr. F. S. Townend, B.Sc., who, as already intimated, has resigned his position at Leeds University to join the staff of Sir Arthur Duckham as Technical Engineer.

THE WOMAN'S EXHIBITION.

Olympia under the Auspices of the "Daily Express"—July 12 to 29.

To mere man, such a display may sound forbidding, may suggest interminable rows of "models," may remind him even of Christmas shopping; but the day after the opening of the Woman's Exhibition at Olympia there were enough men taking a keen interest in the numerous beautiful stands to prove the fallacy of such forebodings. Women, of course, were there in their thousands—women of all walks in life; for the appeal was universal, to Park Lane or Bethnal Green, to manufacturer or consumer.

Woman's interests to-day embrace every sphere of life and activity. She is a very different creature from the emotional, dependent type of the early Victorian novelist. Seventy, even thirty, years ago it would have been very difficult to fill Olympia with interest particular to her. Now she has found her place everywhere—in business, in the professions, in sport; and everywhere Science plays an increasingly important part. It is still certain, however, that her chief *rôle* remains, and must ever remain, as housewife; and this brings us to our chief concern—the representation of gas in the exhibition.

It needed not a biassed judgment to find the gas industry's exhibits most imposing and most attractive. One cannot doubt the increasing popularity of gas for all purposes; nor can it be wondered at in view of the great and continuing improvement in all appliances, which are so ably brought before the public notice. While our friend the enemy is not in great evidence at Olympia, the artistic and hygienic possibilities of gas are amply demonstrated—in fact, its universal utility. For apart from the manufacturers' exhibits we shall notice below, there are gas cooking lectures and demonstrations, competitions in gas cooking for London children, and an eloquent display by the Smoke Abatement Society (whose advocacy of gas led them to display the classified products of coal distillation); while, probably unknown to many of the folk who show such interest in the stand, the Federation of British Launderers' working exhibit burns much gas under pressure, which fuel is universally employed for the purpose.

The London Gas Exhibit.

Recognizing that woman's interest in her home is divided between the nursery, the kitchen, and the drawing room, the London Gas Supply undertakings have met the case with an admirable precision. The handsome pillared stand, with its red frieze and external lighting of Sugg 5-light preheated indirect lamps, is primarily attractive, and the internal arrangement and fittings bear out this first impression. One compartment forms a bathroom, and no ordinary one; for it is an exquisite piece of work carried out in black and gold by Messrs. Davis, Bennett, & Co., of Horseferry Road. On one side of the bath is a recessed lavatory basin, on the other side a recessed shower bath; the supply to all being from a 4-gallon a minute Ewart Califont. There is also a large gas-heated towel rail. All fittings are finished in copper-bronze. Adjacent to the bathroom is what has come to be known as a "worker's kitchen," the main appliances in which are a Richmond "Bungalow" cooker, a gas-copper, and a Parkinson "New Cottage" water-heater, which can supply sink or bath. Three hot baths from it cost about a shilling. The Davis gas iron burns less than a pennyworth of gas in an hour. The day nursery next presents the ideal, a compact cooker and sink occupying a recessed cupboard on one side of the gas fire, and a bath (to lower on hinges from the wall) and "New Treasure" geyser on the other. The fireproof shades and vitreosil globes on the lighting fittings are notable. The contrasted night lighting effect of the night nursery is worthy of mention.

With the exception of the bathroom, all the furnishing was done by Messrs. Heal and Son, of Tottenham Court Road; the drawing room being very fine, the feature in which is a Richmond "Adams" fire with a black and white surround. In the kitchen is a "Compact" cooker (the hotplate of which is hinged to facilitate cleaning), and the well-known "B.T.U." boiler by Messrs. John Wright & Co. The "Davis" refuse destructor merits special mention, as also the neatness of the South Metropolitan No. 4 fire. The lighting fittings are controlled throughout by pneumatic switches.

Radiation, Ltd.

Their usual comprehensive display is offered by Messrs. Radiation Ltd., and is tastefully set out in an open stand with an octagonal centre piece.

Messrs. Arden Hill & Co. are exhibiting: The "New Compact" cooker, which is made in three sizes, and suitable, therefore, for the majority of households; the "King" and "Royalty" gas-fires, which comprise all the advantages of the standardized grates of "Radiation" (they are fitted with duplex taps, enabling the whole or only a portion of the fire to be used, according to the temperature required); and the "Leander" 10-gallon wash-boiler, which is a new departure in economy and efficiency.

Among the exhibits of the Davis Gas Stove Co., Ltd., is the No. 140 "Alpine" cooker, which is the very latest example of this Company's well-known products. Women's ideas have entered very considerably into the planning of the cooker, with the result that ease of working and general efficiency are much in evidence. The No. 10 "Standen" fire is particularly suitable for a dainty drawing room, while the "Georgian" fire is true to period, and is specially made for very large rooms. The "Hector" geyser has been evolved with a view to ease of maintenance in conjunction

with low first cost and a very low cost of working. It can be connected from either the right or left hand. The "Midget" geyser is intended to give an instantaneous supply of hot water for lavatory or scullery use. It needs no flue-pipe, and can be fitted with a flexible shampoo attachment, which is a great boon in a lady's bathroom. There are also shown the "Sentry" coke boiler and the "Garba" heater, both of which have been noticed fully in the columns of our Supplement.

Messrs. Fletcher, Russell, & Co., Ltd., besides the "Palatine" cooker and their latest fires and water heaters, show the "No. 16" quick washer, with which can be supplied a clothes drier and airer. It is an invaluable adjunct to any household where laundry work in large or small quantities is done at home. Their "A1" smoothing iron is made in various sizes and weights; while a curling iron heater is a valuable adjunct to a lady's toilet. A note of utility is also struck by the fire-lighter shown, which is of great use in a household where the coal fire is still extant.

The Richmond Gas Stove and Meter Company, Ltd., are exhibiting No. 3 of their splendid range of "Bungalow" cookers, and the "Florentine" and "Marlborough" fires—examples of the extremes in price of the standardized gas grate. The "Hollar" circulator is an entirely new departure in water-heating by gas, and merits longer description than present pressure allows. The "Lyn" boiler is intended to supply small quantities of hot water to a lavatory basin or a scullery sink, and the "Fairy" gas iron will appeal to every woman. It is light and easy to use; the handle being placed at such an angle as to obviate any unnatural strain on the wrist.

Messrs. Wilsons and Mathiesons, Ltd., present their "Advance" cooker and "Adelphi" fire. The latter has a remarkably silent burner. The copper circulator shown by this firm has the great advantage of being suitable for either hard or soft water, and, owing to the great conductivity of copper, is exceedingly efficient. It can be connected to the existing hot-water circulation or used in conjunction with a cylinder or tank as a complete new installation.

Messrs. John Wright & Co. make a feature of their "Eyelevel" cooker, which represents the latest development in gas cooking apparatus, the advantages of which will be recognized by any housewife. The hotplate is placed at a handy height, and the oven raised so that the work may be done without stooping, the grid shelf between the legs providing a space for storing pots and pans, thus avoiding many unnecessary steps. Where the necessary space is available, this should be installed. For larger installations the "Eyelevel" cooker can be fitted with two ovens—one on each side of the hotplate. The No. 10 "Inigo" and No. 12 "Aero" fires are of the standardized type, and the "B.T.U." boiler set is already widely known.

The asbestos surrounds fitted in each fireplace on the Radiation stand are a new development. They can be supplied in any size and finished in any colour after fixing, the primary object of their use being to cover-up the old-fashioned coal grate, and make a neat and artistic background for any gas grate. They are very much less expensive than tiles; and the effect is equally good. They can be used in the construction of new houses, thereby reducing the total expense very considerably. The "Nautilus" concrete flue-block, which should be used in conjunction with these surrounds, ensures efficient ventilation of the room, and considerably lowers the cost of building.

The Parkinson Stove Company, Ltd.

"The Parkinson All-Gas House is interesting, instructive, and inspiring alike to the housewife, the prospective mistress of the home, and the student of domestic science." We quote from the exhibition catalogue, and fully endorse the remarks. Externally the stand immediately compels attention; it is of pure architectural design of considerable beauty, with high gold-trellised windows. Internally, utility and art combine to catch the eye; and from the exhibitor's point of view the display is essentially well balanced, for the artistic and the commercial unite to draw the public.

The scheme of decoration in the drawing room is exquisite, and centres attention forthwith on the "Minster" armour-bright fire—really a super gas-fire of unusual beauty. A "New Cottage" heater supplies the bath water; and in the kitchen special notice is directed to the "Gacylette" and "Pearl" heaters for sinks or lavatory basins. The display of high-grade fires and cookers will appeal to every level of fancy; the well-known "Holborn" series of cookers being in evidence.

The "Conrad" marks a distinct advance in gas-fire construction, successfully combining high radiant efficiency with a large percentage of convected heat. The latter is diverted into a room by means of a suitably lagged pure air heating chamber, which can easily be cleaned and remain perfectly hygienic. The "built-in" gas-fire registers are ideal for housing schemes, and, on high authority, are capable of saving an enormous sum in building construction.

Other equipment includes Parkinson-Maughan geysers, "New Cottage" heaters (a thousand of which are installed in London alone), and the latest clothes-washing apparatus. Altogether a splendid show.

Messrs. R. & A. Main, Ltd.

Stand 38 is divided into two sections—cooking and heating. The exhibit *par excellence* in the former is the "Maintenance" cooker. This is fitted with a burner known popularly as the "Ace," owing to the flames in action representing the ace of clubs. The design allows a wide space between the various burners; minute air and gas adjustment is obtainable; and the back plate of the oven is made with round corners to facilitate cleaning. A complete kitchen inset of cooker, fire, and "Energy" circulator is shown. The latter will raise 21 gallons of water from 58° to 96° Fahr. in 35 minutes, and represents an efficiency of 83 p.ct. A thermostat is to-day the natural accompaniment thereof.

Messrs. Main make a wash-boiler with cast pan, and one with a tinned-copper pan known as the "Dandy" copper. Their "Batchelor" set, including a most compact baby cooker on a stand and furnished with a lighting fitting and a towel rail, is noteworthy; being designed with space beneath the cooker for a slot-meter. We hope later to publish further details of this apparatus. Mention must be made of a convenient domestic baking plate for pancakes, scones, muffins, &c.

Outstanding in the heating section are the "Author" series of fires and the "Poet" interiors. In connection with the former we noticed the excellent porcelain enamel work; and the surrounds in the "Poet" series were of enamelled sheets, which are both attractive and serviceable, and constitute a pleasant variety. A complete mantel register includes an "Entente" fire.

Ewart's Geysers.

The centrepiece of Messrs. Ewart's stand is a large "Califont," capable of supplying 8 gallons a minute, and connected to the surrounding installations of baths and showers. A variety of smaller geysers is shown; one of the latest developments being the "Victor" geyser with shower attachment. The shower arm and rose are in brass, and reach 2 ft. from the geyser. The latter may be used ordinarily for filling the bath, and an automatic valve is controlled by the water supply.

The "Industria" housing scheme water heater has two containers—a 15 gallon in the top of the casing, and a 1 gallon in the bottom. A two-way tap controls the appliance, allowing the smaller quantity to boil in 5 minutes and providing the 15 gallons at 130° Fahr. in 25 minutes in the alternative position. The "Ever-Ready" boiler is designed essentially for restaurant and café use; the drawing of boiling water from a tap high up on the casing causing the full gas supply to prepare a continuous supply of boiling water. Many people who have found an objection to scrapping their coal range in favour of gas owing to the possible loss of continuous hot water for their airing cupboard, will find Messrs. Ewart have filled the gap with a compact and very economical airer for the purpose.

The Smoke Abatement Society.

In the gallery may be found a stall full of interest and serious advice—the appealing exhibit of this Society. A series of photographs of Sheffield taken on a Sunday, early on a Monday, midday, and in the evening vividly (sombrely, perhaps) illustrate what is a smoke pall, and leave to the imagination what is its effect on the lungs. Thick soot coats the surface of evergreens gathered from Kew Gardens; and Portland stone from Westminster Abbey shows soot which has worked its way inches into a sub-surface crack. A model in the form of miniature factory shafts represents the soot fall in various districts—Rochdale being the black sheep, and Malvern gaining the laurel for cleanliness.

In antithesis we find a host of useful publications, and the labelled range of commercial bye-products from the distillation of coal.

Cookery Demonstrations and Competitions.

Throughout the exhibition at 3 p.m. and 5 p.m. daily in the Demonstration Room near the main entrance, a series of cooking lectures and demonstrations is being given by experts in the craft. Tickets for these are obtainable from the London Gas Exhibit. The subjects dealt with appear to the lay mind to cover every conceivable line of plain and fancy work.

One of the most popular items of all is the cooking competition in the gallery spread over a busy fortnight. An industrious row of youngsters, eagerly watched by a crowd of grown-ups, was at work last Thursday. They had entered the contest for children under 15. The entries are divided into classes according to the eight London gas districts. Other competitions are for students at the National Training School of Cookery; for women trained by the Central Committee on Women's Training and Employment; for women of the British Legion; for hospital nurses; and there is a home cake-making and baking competition. Handsome money prizes have been offered; and the products will be sold on behalf of the combined appeal for hospitals.

These demonstrations, lectures, and competitions are under the ægis of the London Gas Exhibit Committee; the organization and supervision being in the capable hands of Miss Helen Edden, Principal of the Women's Advisory Staff of the Gas Light and Coke Company.

Commercial Gas Company's Dividend.—The Directors of the Commercial Gas Company have declared a dividend on the ordinary stocks for the half year to June 30 at the rates of £5 12s. p.ct. per annum on the 4 p.ct. stock and £5 10s. p.ct. per annum on the 3½ p.ct. stock, payable on Aug. 15.

Institution of Gas Engineers.—We have been informed that copies of the photograph taken at Beckton on the occasion of the visit of the Institution of Gas Engineers and Société Technique du Gaz can be obtained from the Central Press Photograph, Ltd., No. 119, Fleet Street, London, E.C. 4. The price, including postage, is 1s. 6d. unmounted, 2s. 6d. mounted.

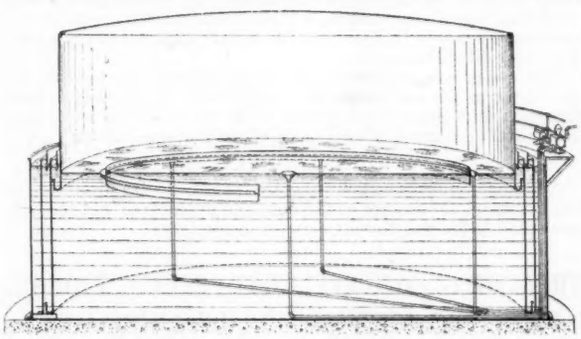
MORRIS OIL-SKIMMER.

As Applied to a Three-Lift Gasholder.

IN the "JOURNAL" for April 26 [p. 201], reference was made to the Morris oil-skimmer with which most of the large gasholders built in the United States during the last ten years have been equipped. The device was invented by Mr. W. Cullen Morris, the Assistant Chief Engineer of the Consolidated Gas Company. The description then given was as follows:

The oil skimmer consists of a ring of steel plate about 3 ft. wide, set vertically and submerged for half its depth in the tank water. This plate forms a ring just outside the timber frame of the crown support, and is carried by brackets attached thereto. The surface of the tank water interior to the bell of the holder is thus separated by the plate or dam into two parts—the circular area interior to the ring or dam, and the annular area exterior thereto. Attached to the outer face of the dam is a trough or gutter suspended by adjustable hangers. The trough is connected to a steam-pump located outside the holder by pipe-lines, which pass downward to the bottom of the tank, along the tank bottom, and up the inner face of the tank wall to the coping, and thence to the pump. Near the centre of the tank is a funnel, which is also connected by a pipe-line to the steam-pump. The upper edge of this funnel is just below the surface of the tank water. By means of this equipment, the light oils which accumulate on the interior surface of the tank water can be skimmed from the outer annulus, pumped back through the funnel, and stored within the dam plate. When desired, the accumulated oil can be withdrawn from the holder by the operation of pumping on the funnel line.

The foregoing was part of a communication to our columns by Mr. Herbert W. Alrich, of New York; and we suggested to him that he should furnish us with a drawing which would show more clearly the arrangement of the Morris oil-skimmer. He has forwarded one, showing the skimmer as applied to a three-lift holder having a steel tank. The drawing illustrates quite clearly the



The Morris Oil-Skimmer.

pump mounted on the tank gallery, with the suction lines passing down to the bottom of the tank beneath the lifts, and rising to the skimmer gutter and the funnel. While the drawing shows the lip of the gutter as being set to but one level, in practice the gutter is in sections, one half of the circumference being set about ¾ in. higher than the other semi-circumference. As the level of the water inside the holder fluctuates with the successive inflation and deflation of the lifts, the adjustment of the lip of the gutter to two different levels permits the operation of the skimmer at two stages of the holder's inflation.

As previously described, by the operation of the pump the light oils, which accumulate upon the surface of the tank water exterior to the circular dam plate to which the skimmer gutter is attached, are pumped off, and delivered back into the holder through the funnel interior to the dam plate. This prevents such oil accumulating upon the surface of the water exterior to the dam plate, and eventually making its way into the cups, in which circumstances the oil would either disfigure the paint upon the exterior of the several lifts or cause the paint to peel off. When desired, the pump can operate on the line from the funnel and withdraw the oil which has been stored within the dam plate.

Though not shown by the drawing, the dam plate and the skimmer gutter attached to it are supported by brackets attached to the crown support, which in American practice is always a permanent frame resting on the bottom of the tank. The practice of trussing the crowns of holders was abandoned in the United States some years ago.

Mr. A. S. Welford, Manager to the Howden (Yorks.) Gas Company, whose death lately occurred, left estate of the gross value of £1006.

According to the preliminary statement by Mr. E. G. Sievers, of the United States Geological Survey, the output of natural gas gasoline during 1921 increased by 23 p.ct. over the figures of the preceding year. Seventy-five p.ct. of the output was obtained from compression plants and the remainder from absorption plants. The average daily production in 1921 was 1,297,000 gallons, as compared with 1,054,093 gallons in 1920. The average daily production per plant in 1921 was 408,000 gallons, compared with an average per day of 333,400 gallons in 1920.

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

Dr. T. Lewis Bailey, Chief Inspector under the Alkali, &c., Works Regulation Act, 1906, in his report to the Minister of Health for the year 1921—it is the fifty-eighth of the series of annual reports—points out that the unusual conditions prevailing throughout the country have made the work of inspection more than ordinarily difficult, because plants have had to be worked under abnormal conditions. Complaints of nuisance were not large in number. A total of 3456 visits of inspection were made during the year.

SULPHURIC ACID WORKS.

The sources of sulphur in the manufacture of sulphuric acid, Dr. Bailey says, call for some attention this year. Spent oxide has come much more into evidence; and for this two reasons may be adduced: (*a*) Reduced output of acid at all works has entailed an accumulation of oxide stocks at works usually burning their own production of spent oxide, as well as at gas-works generally; (*b*) in certain quarters the production of concentrated ammonia in place of sulphate in recent years has had a similar result. Gas-works possessing ammonia bye-product plants have thus found themselves in the unfortunate position of having to pay an unusually high price for acid, while their stocks of spent oxide were continually increasing. Factories equipped solely for the burning of pyrites cannot at will switch over to the use of spent oxide; and the position has become more and more difficult for the gas-works. Recently, however, at a number of sulphuric acid works, where hitherto the sole source of sulphur has been pyrites, steps have been taken to instal plant suitable for the burning of spent oxide; and the way is opened for the relief of a very difficult situation.

A further point to be noted is the difficulty of dealing economically with cupreous pyrites residues, which is another compelling force in the direction of the use of non-cupreous material as a source of sulphur for sulphuric acid manufacture. In a number of works in various parts of the country, American sulphur is now being used, either alone or as an enrichment of spent oxide. The substitution of spent oxide and of sulphur for arsenical pyrites allows of the production of a practically non-arsenical acid direct; and so the troublesome and unpleasant operation of de-arsenication is obviated. But, if there is insufficient deposition of dust in the case of oxide burning, a very inferior Glover acid is obtained; and this brings with it other difficulties.

Extension of the burning of spent oxide in mechanical furnaces has emphasized the need for the adoption of the best possible means of dust deposition. In some instances dust filters have been found to present considerable difficulties. A slowing-down of the speed of the gases by passing them through a large unpacked chamber is one of the most efficient methods of dust removal. The difficulty to be overcome in this case, however, is undue loss of temperature. Sub-division of a chamber by a series of partitions leads to inefficiency; for the very reason that the speed of the gases is too rapid. Baffles in flues are frequently so arranged as to produce merely local increase of speed, with the result that there is little deposition. More use might be made of depressions or sumps in the bottom of flues. Moreover, in this connection, the introduction of secondary air after the burners should receive more consideration. Much still remains to be done on the subject of electrical deposition of dust.

The "ammonia oxidation" method of providing oxides of nitrogen for sulphuric acid chambers has still further established itself. Not only are firms who have already adopted it extending its use; but the method is being taken-up by others in various parts of the country. Difficulties were experienced at one works, causing disorganization for a time, when the method was first introduced; but the working limits had not been sufficiently appreciated. Using a gas mixture containing 10 p.ct. of ammonia, and maintaining a satisfactory gauze temperate, excellent results are obtainable. The advantage gained by pre-heating the ammonia-air mixture by some form of heat exchanger, is a point which should not be overlooked.

SULPHATE AND MURIATE OF AMMONIA WORKS.

Dr. Bailey remarks that the manufacture of sulphate and muriate of ammonia has been carried on under very adverse conditions, to which the results of the coal strike and the high price of sulphuric acid have been contributors. The burden has fallen heavily on the gas-works and coke-oven works, where the manufacture of ammonia compounds constitutes an essential bye-product department. Had it been possible to set off the value of the sulphur in spent oxide against the cost of acid, the position would not have been so bad; but increasing stocks of the former only served to add to the difficulties of the situation. As already pointed out, steps are being taken which will have the effect of relieving the unusual state of affairs—at any rate, in some quarters.

A tendency to increased recovery of muriate of ammonia at coke-oven works is to be recorded.

The advantages of a dry neutral sulphate for agricultural purposes are becoming more and more recognized; and during the year much activity has been displayed in the perfecting of methods for its production. Better physical conditions, increased ammonia content, and reduced deterioration of bags during transport and storage are all points in its favour.

Ammonia Products Manufactured in the United Kingdom (expressed as Sulphate, 25¾ p.ct. NH_3)—Tons.

From Liquor Produced in—	1921.	1920.	1919.
Gas-works	150,228	167,386	164,826
Iron-works	3,265	9,919	10,333
Shale-works	35,146	51,576	46,187
Coke-oven works	56,427	150,012	137,149
Producer-gas and carbonizing works (bone and coal)	8,187	19,044	19,142
Total.	253,253	397,937	377,637

NOTE.—Of the above total quantity of ammonia products, the equivalent of 27,908 tons was manufactured as concentrated ammoniacal liquor; the balance of 225,345 tons consisted of other ammonia products (sulphate, chloride, nitrate, &c.).

Complaints were received alleging nuisance from two works manufacturing sulphate; and in this connection two special points arise. Condensers for cooling the foul gases receive at some works insufficient attention. Caulked joints should be more frequently looked to; and deterioration of condensers should be watched with a view to remedial action being taken immediately signs of trouble are forthcoming. The importance of the cleanliness of plant and of the prevention of external corrosion is by no means recognized in many works. The second point is the advantage of heap purifiers over box purifiers. It has been found necessary to get the latter replaced by the former at one of the larger works, and conditions have much improved. The heap system provides much greater latitude.

It has been necessary on several occasions, during the erection of new works, to call attention to the insufficient depth of seal which it was proposed to provide in the change valves at oxide purifiers. At one works an escape of foul gas was traced to a change valve having a seal of 3½ in. only. This provides an insufficient margin of safety. Water is almost invariably used for sealing purposes; but heavier liquids might be employed with advantage. Moreover, water seals have been known to freeze in winter.

TAR-WORKS.

In this section of the report, Dr. Bailey says that abnormal conditions prevailing in the manufacture of coal gas have to some extent affected the character of the tar at some works; and at one works in particular difficulties were experienced at the tar distillation plant, owing to the unusual amount of foul gases. Improvement of the means for dealing with these gases was asked for, and promptly installed. At a works of which mention was made in last year's report, considerable attention has been paid to various details of plant construction and of the working of the plant, with the result that a better atmospheric condition prevails, and complaints have ceased. It has been necessary to call attention in several instances to the state of pitch coolers. Leaky coolers may become a source of very considerable nuisance. The inefficient sealing of escape pipes from pitch coolers has had to be commented on at several works.

Tar Products Manufactured in the United Kingdom, 1921.

—	Gas and Coke Oven Works.	Other Works.
	Tons.	Tons.
Tar distilled in	1,013,245	40,008
Pitch produced in	384,416	21,401

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUOR.

This forms the subject of the next section of the report; and what Dr. Bailey has to say will be found in succeeding columns.

Acknowledgment is made by Dr. Bailey of the unstinted assistance rendered by his colleagues—particularly during a period when the work of administration has had to be carried on by a reduced staff. To Mr. Linder's excellent work on the subjects requiring both laboratory and works research, he desires to pay special tribute. Great regret is expressed at the death of Mr. W. S. Curphey, late Chief Inspector.

Report for Scotland.

In the report which he has presented to the Scottish Board of Health, Mr. J. W. Young remarks that the chemical industry was profoundly affected by the general depression of trade; so that several works were idle during many months, and none was employed to full capacity. He gives his usual summary of raw materials and of products, but says the position was less favourable even than is shown, since products which in normal years would have been distributed to consumers remained in possession of the makers.

On the subject of complaints, Mr. Young says: The sulphate of ammonia plant of a gas-works was found to be emitting poisonous foul gases freely into the air, instead of by their authorized passage to the oxide of iron purifier. For this flagrant infraction of the Act, the Manager adduced his reasons that his liquor well was full to overflowing, and that an obstruction in his condensers prevented proper working. The Board consented to accept my suggestion—given with much hesitation—to refrain from stern action, in view of the previous good record of the works, and on condition that the plant should speedily be restored to good order.

Ammonia Products, Tar Distilled, and Pitch Produced.

—		1921.	1920.
		Tons.	Tons.
Salts of ammonia (expressed as pure sulphate)—			
From gas-works	18,115		
,, iron-works	3,098		
,, shale-works	35,146		
,, coke, producer-gas, and carbonizing works	5,984		
		62,343	*96,804
Tar distilled—			
At gas-works and coke-ovens	116,180		
,, other works	32,428		
		148,608	245,097
Pitch produced—			
At gas-works and coke-ovens	40,944		
,, other works	17,889		
		58,833	120,041

* For comparison this quantity has been re-calculated also to pure sulphate.

Referring to sulphuric acid works, he remarks that the consumption of spent oxide has increased; and it is to be desired, in view of high costs of rail haulage and of iron pyrites, that all such oxide produced by Scottish gas-works should be consumed at home.

SULPHATE AND MURIATE OF AMMONIA AND GAS LIQUOR WORKS.

Adverse conditions greatly affected this group, and output from other than gas-works has been much less than usual.

Attention continues as to improved quality of sulphate, both in freedom from acid and in dryness. Various means have been adopted for the latter—in some cases by erection of special dryers, elsewhere by ingenious use of existing appliances. It remains now to increase the size of the individual crystals, as the larger-grained variety rightly is preferred. Vacuum saturators, with their lower temperature, already satisfy in this respect; but for pressure plants further research seems required on the exactly favouring conditions.

One works has provided a meter to measure the feed of raw gas liquor to the ammonia still. Regularity of working is aided thereby; and since the entering liquor is visible through glass, accidental admixture of tar can be noticed and arrested.

TAR-WORKS.

Additional stills have been erected, chiefly to dehydrate tar for road making. These are of the continuous pattern; but for complete distillation the discontinuous still is general.

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUOR.

[From the Report for 1921 of Dr. T. Lewis Bailey, Chief Inspector under the Alkali Works Regulation Act.]

There is an increasing number of cases of difficulty in regard to the disposal of these liquors. The main body of effluent is capable of giving rise to considerable offence when hot, by reason of the phenoloid and other vapours that accompany the steam which is given off. Passage through a system of settling pits is usual, to remove the bulk of the suspended matter and to effect the amount of cooling necessary before the settled liquor can be passed out of the works to sewers or watercourses. In many cases, to prevent nuisance in the neighbourhood of the works, settling pits are covered in; and even small scrubbing towers have been added to deal with evolved steam. But difficulties are met with even after settling and cooling; and works are being held-up by the impossibility of disposal of the effluent liquor; local authorities objecting to deal with it. Treatment with sulphurous acid is in some cases resorted to; but the results are not necessarily permanent. The whole subject needs consideration and investigation; and we have done much work on it during the past year, both in the laboratory and at works.

Of the total effluent, by far the larger proportion (over four-fifths) is obtained direct from the still; the remainder being the devil-liquor condensed from the saturator waste gases. The former is a brown liquor, turbid with particles of spent lime and tarry matters. It is heavily charged with acidic and basic tar oils and sulphur compounds. The devil-liquor, in addition to pyridine, sulphuretted hydrogen, carbonic acid, and hydrocyanic acid, contains a notable amount of phenoloid bodies. The effluent has a high oxygen absorptive power; and there is little doubt that the deepening of colour, on exposure of the liquor to air, is due to direct absorption of oxygen by phenoloid or allied compounds, though the exact mechanism of the reaction may not yet have been fully elucidated. [Lunge on "Coal Tar and Ammonia."]

The volume of liquor discharged from the ammonia distillation process is related primarily to the ammonia content of the liquor distilled, which varies widely, not only in liquors of different origin (gas-works, coke-ovens, iron-works, &c.), but in liquors of the same class. It is related in secondary degree to the amount

of steam used on the still and the volume of lime water added to liberate the fixed ammonia.

The total volume of effluent liquor from a still fed with 8-oz. liquor (1·7 p.ct. NH_3) would, theoretically, somewhat exceed 4900 gallons per ton of sulphate made; and with liquor of 10-oz. strength (2·2 p.ct. NH_3), it would be somewhat less than 4000 gallons, if 50 p.ct. increase of volume be allowed for the condensed steam and added lime water. But estimation of the ammonia content of a liquor by hydrometer test is by no means a reliable method. In the gas-works at which the present research has been carried out, the volume of effluent spent liquor per ton of sulphate of ammonia made is returned as 4000 gallons for a gas liquor of 8 to 9 oz. strength—2500 gallons for the liquor as distilled, 1500 gallons for the net increase in still. The volume of effluent liquor per ton of sulphate at a coke-oven works by the older process would much exceed this figure. Dr. H. Maclean Wilson gives data indicating a figure of 9000 to 10,000 gallons.

Coke Oven Practice—Calculated on the Dry Coal Converted into Coke.

	P.Ct.		Gallons.
Water of combustion	4–6	..	9–14
Moisture in coal	10–15	..	22–33
Water from scrubbers	15–20	..	33–45
Steam for distillation	8–10	..	18–22
Lime water added to stills	10	..	22

With a semi-direct plant the volume of waste liquor is reduced to one-half—say, to 50 gallons per ton of dry coal, or 4500 to 5000 gallons per ton of sulphate made.

The composition and properties of spent liquor from gas-works have been fully investigated by J. H. Skirrow ["J. Soc. Chem. Ind.," 1908, 58], and by Fowler, Ardern, and Lockett [*ibid.*, 1911, Feb.]. These authors summarize the composition and properties of an average spent liquor in the following table:

Fowler, Ardern, and Lockett.	Per 100,000.	Skirrow.	Per 100,000. Parts.	Per 100,000. Oxygen Absorbed in 3 Mins.	Per Cent. of Total Oxygen Absorbed.
"Phenols"	140·1	Tar acids	212	284·7	52·0
Thiocyanate (CNS)	153·8	Thiocyanate (CNS)	225	182·7	33·3
Thiosulphate (S)	46·8	Thiosulphate (S)	64	53·0	9·7
Oxygen absorbed—		Ferrocyanide (as sodium salt).	28	0·5	0·1
4 hours	499·4				
3 minutes	333·9				
Ammonia—		Other bodies (by difference).	—	26·9	4·9
Free and saline	12·8				
By alkaline perman	14·2				
			—	547·8	100·0

The relative amounts of oxygen absorbed by the various constituent bodies present in the liquors examined by Skirrow were calculated from data obtained by direct test on dilute solutions of phenol, thiocyanate, &c., under identical conditions of temperature, time of contact, and dilution. He found (three minutes' test at 23° C.):

	Grm. Oxygen.
1 grm. phenol ex gas liquor absorbed	1·401
1 grm. cresol ex gas liquor absorbed	1·245
1 grm. tar acids (average) ex gas liquor absorbed	1·343
1 grm. sodium thiocyanate absorbed	0·582
1 grm. sodium thiosulphate absorbed	0·336
1 grm. sodium ferrocyanide absorbed	0·018

Fowler, Ardern, and Lockett found that phenol is more rapidly oxidized on a bacterial filter than thiocyanate; the products of oxidation being most probably carbonic acid and water.

A valuable contribution to our knowledge of the properties of effluent spent liquor in relation to bacterial life was made by Prof. P. F. Frankland and H. Silvester.* In connection with the extraordinary oxidizing powers displayed by bacteria beds, they made experiments which showed the amount of oxygen required for the oxidation of the chief ingredients of spent liquors, and compared these with the amounts theoretically required, assuming the following reactions:

(1) $CNS + 3O = SO_3 + CN$.
(2) $S_2O_2 + 2O_2 = 2SO_3$.
(3) $C_6H_5OH + 7O_2 = 6\,CO_2 + 3H_2O$.

In four hours' test at 80° Fahr. (27° C.):

—	1 Part of Ingredient.	Oxygen Absorbed (experimental).	Oxygen Required by Theory.
1	Sulphocyanide (CNS)	0·827	0·827
2	Thiosulphate (S_2)	0·856	1·00
3	Phenol (C_6H_5OH)	1·78	2·38

The work of oxidation to be carried on by the Oldbury bacteria beds was shown to be:

Ingredients in 24 Hours' Flow (maximum).	Weight.	Weight of Oxygen Required for Complete Oxidation.
	Cwt.	Cwt.
Sulphocyanide	9·6	8·0
Thiosulphate	2·9	2·9
Phenol	8·75	20·8

* See "JOURNAL," Vol. XCVIII., p. 92.

Consideration of these facts favours the conclusion that the most noxious constituent of effluent spent liquors, judged by the oxygen absorption test, is not thiocyanate, but "phenol," and that the removal of such from the liquor before its final discharge from the works should effect a notable improvement in the noxious character of the liquor. The question of effluent disposal has become acute, not merely from the Alkali Act standpoint, but also from that of the manufacturer, who is threatened with closure of his plant owing to his inability to get rid of a noxious waste product.

Phenols are removable from solution by steam distillation; and the obvious method suggested itself to attempt the removal of phenoloid constituents by passing the spent liquor down a tower up which hot fire gases are blown by means of a steam injector. It has been shown that this method is quite feasible.

As regards thiocyanate, no practical method of removing this constituent has yet been found. Thiosulphate is equally difficult of removal. Both bodies are comparatively stable, and resist oxidation by air in dilute solution. Thiocyanate and thiosulphate are both regarded as "oxidation" products, the amount of which in ammoniacal liquors is largely determined by contact of the liquor with oxygen in the condensing and scrubbing systems of the coal-gas plant and storage wells. In coke-oven liquor, freshly produced and protected from contact with air, the bulk of the sulphur will be in the form of sulphide, and the bulk of the cyanogen as volatile cyanide. On storage in contact with air there is formation of thiosulphate from sulphide by direct oxidation, and of thiocyanate by indirect oxidation.

Judged, then, from the point of view of the quality of the spent liquor obtained, and apart from the loss of volatile ammonia, prolonged storage of the ammoniacal liquor in contact with air causes marked depreciation of quality. The effect is more noticeable in the case of coke-oven liquors, as the proportion of thiocyanate to cyanide is markedly less in fresh coke-oven liquor than in an average gas-works liquor, and the percentage increase of thiocyanate on storage is proportionately greater. Thus:

Liquors from Storage Wells.	As Made. Thiocyanate Calculated as CNS.	As Made. Hydrocyanic Acid as HCN.	Calculated Composition after Storage. Thiocyanate Calculated as CNS.	Calculated Composition after Storage. Hydrocyanic Acid as HCN.	Increase of Thiocyanate per Cent. of that Taken.
	Grms. per 100 c.c.	Grms. per 100 c.c.	Grms. per 100 c.c.	Grms. per 100 c.c.	
Coke-oven works (average of nine liquors)	0·032	0·043	0·124	*Nil*	290
Gas-works (average of six liquors)	0·403	0 029	0·465	*Nil*	15

The relative volumes of effluent liquor per ton of sulphate of ammonia made in coke-oven works and gas-works respectively would be 2½ to 1. Data are lacking to establish a comparison between the relative amounts of phenol, thiocyanate, and thiosulphate (per ton of sulphate made) discharged from coke-oven and gas-works; but there would, in general, be a smaller weight of thiocyanate in the coke-oven effluent, as coke-oven liquors are usually distilled as made, and on the works, whereas gas-works liquors are sometimes transported to a chemical works for distillation, and are often stored for a considerable period prior to distillation. On the other hand, judging by the general character of the liquors, the proportion of phenoloid bodies would be relatively higher in coke-oven liquors.

An average sample of effluent from the settling pits of a gas-works sulphate plant has a "phenol" content equivalent to about 0·8 to 1·5 grm., C_6H_5OH per litre. It also contains notable amounts of thiocyanate and thiosulphate associated with other bodies. The acids will all be present as calcium salts; and in addition traces of free lime and volatile ammonia are present, which render the liquor strongly alkaline. Furthermore, devil-liquors are much richer in "phenols" than the liquors from the stills, and contain also more or less sulphuretted hydrogen and hydrocyanic acid—bodies usually absent from the still effluent. So large, indeed, is the amount of "phenols" in certain samples of devil-liquor, that it is estimated that 50 p.ct. of the entire phenol content of the ammoniacal liquor distilled at such works is ultimately obtained in the devil-liquor. It is a question for consideration, therefore, whether in certain cases it would not be practicable to submit the devil-liquor to separate treatment—say, by evaporation—and thus free the effluent spent liquor from a notable proportion of the phenol, its most noxious constituent. In the present research, the problem of spent liquor treatment has been viewed in its wider aspect; and no account is taken of methods of treatment that might find limited application in special cases.

The coloration of spent liquor appears to be closely related to the presence therein of oxidizable organic bodies, and only manifests itself in alkaline solution. If the spent liquor be slightly acidified with sulphuric or sulphurous acid, it is "decolorized"—that is, the colour changes from a deep claret brown to light straw colour. If the decolorized liquor be again rendered alkaline, the brown colour is restored; and so sensitive is the colour change to the presence of alkali, that mere admixture with tap

water will often restore the colour to a "decolorized" effluent, provided there is sufficient carbonate of lime present to neutralize the excess of acid.

A large proportion of the alkalinity of the effluents examined was found to be due to traces of volatile ammonia and pyridine that had escaped volatilization in the still. These volatile constituents are readily removed on boiling, leaving a liquor with a fixed residual alkalinity due to the presence of free lime.

Judging by the vapour tension of phenol in presence of dilute caustic soda, and the behaviour of effluent spent liquor on boiling, the amount of free lime usually present can have little effect in determining the volatility of phenoloid bodies when the liquor is boiled or when a current of air or boiler flue gases is passed through the liquor at a temperature approaching the boiling point. At one works, practically the whole of the "phenol" was volatilized when 50 c.c. of the liquor was raised to 80° C., and steam passed through; the condensate measuring 80 c.c. It should be possible, therefore, to remove the bulk of the "phenol" from such liquors by simple treatment at 90° to 95° C. with boiler-fire gases.

Steam treatment by itself, however, though it undoubtedly effects the removal of the bulk of the "phenol," still leaves the liquor with its original colour. To decolorize the liquor a proportion of mineral acid is needed. The amount of acid required will be less in proportion as the distillation process is carried to completion, with minimum excess of free lime. Analysis of liquor at a certain works indicates that the amount of free lime in the settled effluent in a well-conducted works need not exceed the equivalent of 0·01 part of sulphuric acid (H_2SO_4) or 0·006 part CaO per 100 parts of liquor. The volume of spent liquor per ton of sulphate made at these works approximates to 4000 gallons; and this would require 4 lbs. of 100 p.ct. acid to decolorize it, if we disregard the volatile alkali and consider only the free lime. 4 lbs. H_2SO_4 (= 28,000 grains) is an amount contained in 28,000 c.ft. of boiler-fire gases, if the total acidity be reckoned in terms of H_2SO_4; and 28,000 c.ft. of boiler-fire gases per 24 hours corresponds to one-third of a cubic foot per second.

It would appear to be practicable, therefore, to decolorize an effluent liquor by treatment with boiler-fire gases and steam in a suitable scrubber, and at the same time to volatilize a large portion of the phenoloid bodies, with the production of a deodorized and almost colourless effluent suitable for admission to the sewers. Experiments were therefore instituted in the laboratory to determine the data for the erection of a large-scale unit at the works.

The apparatus consisted of a 700-c.c. round bottomed flask (A), fitted with air inlet tube, sealed in the liquid, and short wide-bore tube delivering exit gases to the bottom of a scrubber tube (B), 36 c.m. high by 3·8 c.m. diameter, packed for 27 c.m. of its length with pieces of hard glass surmounted by 3 c.m. of broken pumice (2 m.m. size). A small-bore tube supplied liquor from a tap funnel to the top of the scrubber; and the exit tube leading to the absorber (C) was arranged to carry a thermometer required for indicating exit temperature. The cylindrical absorber (C), 42 c.m. high by 2·95 c.m. diameter, surrounded by a water bath, was packed for 30 c.m. with pieces of hard glass. A thermometer indicated the temperature of the exit to a catch vessel (D), a water-cooled receiver fitted with stopcock below, and charged with 100 c.c. of distilled water. Gases entered the absorber C by a side tube near the bottom; and a run-off cock was provided for removal of liquid. An earthenware aspirator vessel completed the train of apparatus; the volume of air aspirated being calculated from the volume of water run—due allowance being made for aspirator pressure and temperature in the final reduction of volume to 0° C. and 760 m.m.

The water-jacket to the absorber C. was first brought to the desired temperature (80° to 85° C.), 100 c.c. of distilled water were then placed in A, and connection was made to B, and through B to the aspirator, which was then started at 100-120 c.c. per minute. The water in A was then raised to the boil, and boiling was continued with air passing until the thermometer at the exit of B showed the desired temperature (85° to 95° C.). The aspirator was then stopped, the scrubber B was connected to C, and this to D, which was connected with the aspirator. The liquor feed to B was then started, and the experiment continued, with due regulation of liquor feed, aspirator, and rate of boiling of the liquid in A.

At the end of the experiment, the volumes of liquor in A, C, and D were carefully measured at air temperature; and analyses were made to determine the amount of phenol condensed in C and D. The results obtained are presented in the table below.

Considering the results in detail we see:

(1) Volatilization of phenol is poor with a liquor feed of 7·6 c.c. per minute [Expt. No. 1 (*a*)]. The relatively small amounts of liquor vaporized in B and condensed in C indicate that contact of liquor and steam was imperfect—cold liquor appears to have descended on one side, and steam and air ascended on the other.

(2) Volatilization of phenol is satisfactory in Expts. 1 (*b*) and 2 (*a*); but the high exit temperature of B (96·97° C.) has led to undue volatilization of water.

(3) The effect of doubling the rate of air current in promoting volatilization of phenol is seen in Expt. 2 (*c*), where the efficiency is 91 p.ct. with a scrubber exit temperature of 84° C., as against 68 p.ct. with an exit temperature of 91° C. in Expt. 2 (*b*).

(4) Comparison of the relative weights of phenol condensed in C and D respectively indicates that phenol has a perceptible vapour tension in aqueous solution at 80 to 85° C., even at the low concentration of 0·1 grm. C_6H_5OH per 100 c.c. [Expt. 2 (*a*)].

The vapour tension of phenol under the observed conditions can be readily calculated from the data given in the table. Thus, Expt. 2 (*c*):

Absorber C.—Volume of liquor at finish = 16 c.c. (of which 11 c.c. is vapour condensed from the entering gas and 5 c.c. is water on the glass packing at start).

Weight of phenol condensed = 0·064 grm. C_6H_5OH.

Concentration of phenol per 100 c.c. liquor condensed = $\frac{100}{16} \times 0{\cdot}064 = 0{\cdot}4$ grm.

Water Catch D.—Increase vol. during experiment = 9·0 grms.

Add water carried away by air = 0·15.

Total 9·15.

Whence, volume of water vapour leaving C, measured at 0° C. and 760 m.m.

$$= 9{\cdot}15 \times \frac{1000}{805} = \text{11,360 c.c.}$$

Phenol condensed = 0·034 grm.

$$= \frac{0{\cdot}034}{94} \times 22\,400 \text{ c.c. (0° C. and 760 m.m.)} = \text{8 c.c.}$$

Aspirator.—Vol. of air measured at 0° C. and 760 m.m. 13,000 c.c.

Total vol. . . . . 24,368 c.c.

The vapour tensions of water and phenol respectively are

Volatilization of "Phenol" in a Current of Air.

Experiment No.	Liquor.	Time.	Air Aspirated.		Glass Packed Scrubber, "B."			Tower Absorber, "C." Glass-Packed—no Liquid.				Catch Vessel, "D." 100 c.c. of Cold Water.		"Phenol" Volatilized and Condensed.	
			Volume 0° C., 760 m.m.	Rate, c.c.	Temp. at Exit.	Liquor Feed Rate, c.c.	Phenol in Liquor Fed.	Temp., °C.		Liquor Condensed.	"Phenol" in Condensate.	Liquor Condensed.	"Phenol" in Condensate.	Total.	Per Cent. of Total "Phenol" Taken.
								Water Bath.	At Exit of Absorber.						
		Mins.	c.c.	Per Min.	° C.	Per Min.	Grms.			c.c.	Grms	c.c.*	Grms.	Grms.	
No. 1 (*a*)	Solution of pure phenol.	66	8,480	128	96	$\frac{500}{66}=7{\cdot}6$	0·4960	86	82†	15	0·1235	8‡	0·010	0·1335	27
,, (*b*)	Solution of pure phenol.	55	6,650	121	97	$\frac{90}{55}=1{\cdot}6$	0·0890	87	83†	94	0·0770	6‡	0·004	0·0810	91
No. 2 (*a*)	*Works C*—Effluent from still (settled).	60	5,620	94	96	$\frac{82}{60}=1{\cdot}4$	0·0975	89	85†	84	0·0870	6‡	0·012	0·0980	100
,, (*b*)	,, ,,	58	6,800	117	91	$\frac{100}{58}=1{\cdot}7$	0·1190	86	82	28	0·065	5·0	0·016	0·0810	68
,, (*c*)	,, ,,	56	13,000	232	84	$\frac{91}{56}=1{\cdot}6$	0·1080	83	80	11	0·064	9·0	0·034	0·0980	91
No. 3	*Works A*—Mixed still and devil liquors.	66	10,350	157	90	$\frac{100}{66}=1{\cdot}5$	0·095	86	82	27	0·040	9·0	0·023	0·0630	66

* Net increase uncorrected for water vapour in air passing to aspirator. † Approximate. ‡ Calculated.

Decolorizing and Dephenolating Scrubber—Hornsey Gas Company.

Effluent Spent Liquor rom Still (settled). Devil Liquor Re-pumped to Still.	Test—Feb. 27, 1922. Scrubber, 18 ft. × 3 ft. diam. Inlet pipe for boiler flue gases, 2 in. diam. Exit pipe to chimney, 6 in. diam.		Remarks.
Scrubber :—			
Volume of coke packing . . . . . c.ft.	106		The total make of sulphate of ammonia at the time of the experiment was 2¾ tons, and of the effluent spent liquor 8000 to 9000 gallons per 24 hours.
Size of coke	In pieces size of walnut		
Temperature of exit gases . . . . . °C.	96°		
Liquor treated :—	Feed liquor* entering.	Treated liquor leaving.	At 8000 gallons per 24 hours the effluent from the scrubber was decolorized ; with a greater rate of flow the effluent was brown and alkaline.
Temperature . . . . . °C.	85°	95°	
Volume—Gallons per 24 hours	8,000	7,300	
" " minute	5·55	5·05	
Character.	Alkaline, deep claret, clear.	Neutral, very pale straw, clear.	
Analysis :—Parts per 100.			The general methods of analysis employed were those described in the "Technical Index to Alkali Reports," 1894 to 1917.
Alkalinity : Calculated as H_2SO_4—			
Volatile—free NH_3 pyridine, &c.	0·06	*Nil*	
Fixed—lime	0·01	*Nil*	The phenol was estimated by Titherley's method.
Volume of boiler fire gases equivalent to the lime cubic feet (15·6° C.)	56,000	—	
Chloride, calculated as HCl	0·178	0·195	After two weeks' use, there was no deposit of carbonate of lime in the general body of coke ; only a little white deposit on the top layer.
Sulphide, calculated as H_2S	*Nil*	*Nil*	
Cyanide, calculated as HCy	*Nil*	*Nil*	
Ferrocyanide, calculated as HCy	Traces	*Nil*	
Thiosulphate, calculated as sulphur	0·0235	0·0250	The steam injector worked at 120 lb. pressure.
Thiocyanate, calculated as CNS	0·067	0·067	No effect on the boiler pressure was noticeable by the fireman when the injector was at work.
"Phenols" calculated as C_6H_5OH	0·103	0·066	
Oxygen absorbed, calculated as O_2 (4 hours at 27° C.)	281·5	219·5	
Efficiency :—	Volume of Effluent : Volume of Feed as 0·91 : 1.		The treated liquor after mixing with tap water acquired a purplish tinge.
Per cent. removed of total entering—			
Thiosulphate	*Nil*		
Thiocyanate	9		On making alkaline with caustic soda solution (5 drops of N/2NaHO), the colour deepened to a light brown, and to brown when peroxide was added to the alkaline solution.
"Phenols"	42		
Oxygen absorbed (4 hours at 27° C.)	29		

* The feed liquor was sampled at the settling pits, and was then raised to the top of the scrubber by steam injector. Some slight dilution would occur *en route* ; but this will not affect the efficiency figures, which are based on the chloride figures as standard.

proportional to the relative volumes present in the gaseous mixture. Whence—

Vapour pressure of water at 80° C. found $= \frac{11,360}{24,368} \times 760$

$= 354$ m.m. (Lunge and Hunter give 353·9 m.m.)

Vapour pressure of phenol at 80° C. in solution containing 0·4 grm. of C_6H_5OH per 100 c.c. $= \frac{8}{24,368} \times 760 \quad = 0{\cdot}25$ m.m.

Using the above data to calculate the size of scrubber needed to deal with 4000 gallons of effluent per 24 hours—*i.e.*, the effluent produced per ton of sulphate of ammonia—we have for an efficiency of 90 p.c. [Expt. 2 (*c*)] :

Phenol in liquor, 0·119 lb. per 10 gallons	= 47·6 lbs. per 24 hours.
90 p.ct. of this gives the amount to be volatilized	= 42·8 lbs.
13 litres, or 0·46 c.ft., of air will volatilize 0·098 grm. . . .	= 0·000216 lb. phenol.
Whence, volume of boiler-fire gases (0° C. and 760 m.m.) required to vaporize 42·8 lbs. phenol	= 91,000 c.ft. per 24 hours, or 1·05 c.ft. per second.

Of this volume, 21,000 c.ft., or less than one-third, would suffice to decolorize the effluent.

As regards the size of scrubber needed to effect the treatment, it may be calculated from the apparatus used that a scrubber 16 ft. high by 3 ft. diameter, packed for 13 ft., would serve quite well.

Confirmatory data were obtained at the works by means of an apparatus of laboratory dimensions erected at the boiler flue by the works chemist, and operated by him under conditions similar to those observed in the experiments described above. The apparatus consisted of a metal cylinder 18 in. high by 5 in. diameter (= 0·205 c.ft.), packed with small pieces of hard coke. Effluent spent liquor from the settling pits was fed on to the scrubber hot (80° C.) ; and in its descent it met an upward current of boiler-fire gases (total acidity equivalent to about 1 grain H_2SO_4 per c.ft.), driven in at the base of the scrubber by a bunsen pump operating as a steam-ejector. The volatilized phenol and water vapour escaped into the air from the top of the scrubber. Working thus at different rates of flow, it was found that the maximum rate of feed consistent with due decolorization of the liquor was 160 c.c. per minute, or 240 gallons of liquor per c.ft. of packing per 24 hours.

The apparatus was then remodelled, and further tests made of its efficiency. Analyses made by Mr. Linder showed that 85 p.ct. of the "phenols" entering the plant was volatilized. The effluent liquor from the scrubber was faint brown, neutral, and clear. With the small test scrubber, however, conditions were not strictly under control, and essential data were lacking—*e.g.*, figures to show the volume of fire gases passing and the temperature of exit gases and effluent liquor.

Large-scale experiments were then commenced—the Engineer and General Manager of the Hornsey Gas-Works, Mr. J. W. Buckley, M.Inst.C.E., considering the results of the preliminary experiments sufficiently promising to justify the erection of a large-scale unit. The scrubber consisted of an old boiler tube ; and the accessory parts—steam injector and connections—were taken from stock. Working conditions, therefore, were by no means ideal ; but the results of the preliminary trials were considered highly satisfactory by the management, and plant is being modified on approved lines. The results of a trial run are recorded in the above table.

In calculating the "efficiency" figures, due allowance has been made for the concentration that takes place in the scrubber. The volume of the outlet liquor could not be conveniently determined by direct measurement ; but the relative volumes of the feed and outlet liquors can be approximately calculated from the percentage figures for chloride, as chlorides are stable under the conditions of the test. The net effect of added steam and of loss of aqueous vapour at the exit is a liquor concentration of about 9 p.ct., calculated on the volume of feed liquor.

The volatilization figure for phenol (42 p.ct.) and the reduction in the figure for oxygen absorption (29 p.ct.) are not considered sufficiently satisfactory ; but the volume of liquor treated is double that for which the scrubber was designed, and the volume of boiler-fire gases was deficient.

After adding a second scrubber, lagging both scrubbers, replacing 2 in. fire gases inlet by 3 in., and increasing the size of the packing, results so far improved that (on May 19) there was removal of 56 p.ct. of the "phenols" and 7·5 p.ct. of the thiocyanate ; and the oxygen absorbed (4 hours' test at 27° C.) was reduced by 31·5 p.ct.—results which may be looked upon as highly satisfactory at the present stage. The volume of fire gases is still short ; and it is anticipated that with larger gas inlet and exit pipes, and with the addition of a small fan, even further improvement will be effected.

Very cordial thanks are tendered to Mr. J. W. Buckley for his kind co-operation at every stage of the inquiry, and to his Chemist, Mr. Ratcliffe, whose able assistance has been of the greatest service in the works tests.

The report also includes a lengthy appendix dealing with the estimation of phenol in trade liquors.

FACTORIES AND WORKSHOPS REPORT.

A wide range is covered by the matters dealt with in the report for 1921 of the Chief Inspector of Factories and Workshops, which again includes a series of chapters by the inspectors having charge of different branches of industry. The Chief Inspector (Mr. R. E. Graves, C.B.E.) remarks that, inasmuch as, generally speaking, the circumstances existing throughout the year were such as to discourage the outlay of money in trade developments or the erection of new works, it is of interest to note such developments as have been going on. Among the more important of those mentioned in the reports of the inspectors is the introduction of a new type of gas-producing plant in a steel works in Swansea, the output of which is said to equal four ordinary gas-producers, while at the same time effecting considerable reduction in coal and labour costs, and, in addition, involving far less hot and arduous conditions for the workers. Since its creation in January, 1921, it is said, the Engineering Branch has proved its usefulness. Mr. Taylor and Dr. Legge both gave evidence before the Committee on Carbon Monoxide appointed under the Gas Regulation Act, 1920. The Department is concerned because the same gas is used both for domestic purposes and for various purposes in factories and workshops. The two gentlemen named have revised and amplified the Departmental memorandum upon the "Dangers from Carbon Monoxide Poisoning in Factories,"* and it has been issued in pamphlet form. Mr. Taylor has also dealt similarly with the Memorandum upon the "Dangers in Connection with the Use of Acetylene and in Oxy-Acetylene Welding." Among other pamphlets issued during the year was one on "Lighting in Factories and Workshops."† The Departmental Committee on Lighting of Factories and Workshops (appointed in January, 1913) issued their second report during the year under review‡. In this report they dealt with the conditions necessary to secure suitable artificial lighting under the important headings of glare, shadow, and constancy.

Dealing with the subject of Safety Committees and Safety Inspectors, Mr. H. J. Wilson points out that, owing to the depressed condition of industry, employers have been inclined to take only a passive interest in this matter; but nevertheless very considerable progress is reported throughout the country. There is a chapter on the generation and use of electricity by Mr. G. S. Ram, who says that, in the matter of electrical installations, reports from the staff confirm his own observations that, generally, the quality of new work on factory premises continues to improve, but that there are exceptions—usually where the occupier, not having technical knowledge, relies entirely upon a contractor who secures the order on the question of price only. "The contractor sometimes being incompetent or unscrupulous, an inferior and often dangerous job results. A useful object-lesson for such contractors was afforded recently in a prosecution by the Department following a fatal accident, when the contractor was held to blame, and had to pay the fine and costs of the case." A reduction of 20 p.ct. on the total number of accidents compared with each of the two preceding years, is attributed partly to a higher standard of electrical work generally, and to some extent to slackness in trade.

Writing on health and sanitation, Mr. E. A. R. Werner states that cold workrooms are more common than unduly hot ones; and it is still frequently found that the means of heating are inadequate, especially where exhaust ventilation has been introduced. Fortunately, however, employers are coming to realize that uncomfortably cold rooms are not satisfactory, even from a commercial point of view. He goes on:

> The use of flueless gas-stoves (and other means of heating which tend to vitiate the atmosphere) appears to be declining in most districts. Water and steam circulation systems, however, do not always receive the attention necessary to maintain their full efficiency. Mr. Jones (Halifax) mentions an interesting method of heating a small engineering works. The exhaust pipe of a gas-engine is surrounded by a concentric tube, which extends to the open air. A small centrifugal fan draws heated air through the tube, and blows it into a duct fixed on the workshop wall; the hot air escaping through openings at various points. Not only is a reasonable temperature maintained in the factory, but the extra cooling of the gases in the exhaust pipe has increased the efficiency of the engine.

Many inspectors express surprise at the little interest shown by employers generally in the subject of lighting. Mr. Verney (South London) declares that "it is not usual to find an entirely satisfactory system of lighting." Inadequate lighting is provided at hazardous points; and screening of intense lighting still needs great attention, though employers are becoming more alive to this necessity. "Obsolete means of lighting still exist in many places. Sheffield, Birmingham, and Norwich inspectors report the continued prevalence of batswing gas-burners."

It seems that reports from all over the kingdom show that the welfare movement has held its own in face of the adverse circumstances of the times; but Miss H. Martindale has to admit that in many cases the response made to welfare orders by the workers—especially men workers—has been disappointing. Employers complain, and not without reason, that workers will not co-operate with them to keep up the original standard set in regard to welfare. She suggests that workers require more education in the advantages accruing from welfare provisions, and that much can be done in this direction by supervision—especially by the welfare supervisor and others throwing themselves wholeheartedly into the enterprise. Probably more will be done—and that of a more permanent nature—by the formation in factories of Works Committees; and it is therefore encouraging to her to find that the idea of Works Committees is gradually spreading, and that where they have been tried they have found favour. Samples are cited of good work done by such Committees.

Dr. T. M. Legge, in an interesting section on industrial diseases, says that many of the reports again emphasize the importance of dust removal. A comparative table of accidents from gases and fumes shows a slight increase in the number during the past year from carbon monoxide over that of 1920. Of 27 cases (with three deaths) in the manufacture of producer gas, nine were due to repairing operations and ten to cleaning. Of eighteen cases due to coal gas, eight (with one death) occurred in gas-works proper; and ten (with three deaths) from the use of gas on factory premises. Dr. Legge's remarks on treatment in cases of poisoning by carbon monoxide may be reproduced:

> In the treatment of poisoning by carbon monoxide at blast-furnaces and on producer-gas plants, there is still difficulty in making the rescuers understand the importance of rest. The probable reason for walking up and down men who have been gassed, is that the rescuers feel they are doing something, ignoring the state of shock into which the patient has fallen. One of the essentials in treating shock is to keep the patient warm, and treatment in the open air, if there is a room available, is inadvisable. In addition to the shock and lowered vitality of the patient, the damage done to the heart muscle itself by carbon monoxide gas is the principal reason why rest should be enjoined. Cases are known where sudden collapse and death have followed after the exertion of walking home, and are probably due to damage done to the heart itself.

There is a lengthy discussion of the question of anilin poisoning; and as to pitch and tar ulceration or cancer, it is said that three of the cases reported among tar workers reveal a new source of danger, as they occurred to stokers employed on the top of producer plants, who are exposed to escaping fumes when manipulating the coal at the poke-holes.

In a chapter on underground workrooms, Miss Martindale gives a list of the types of illumination used for artificial lighting, and says: "In 71 p.ct. of the workrooms electric light only was used for illuminating purposes; and this illustrates to what a great extent gas is being superseded for this purpose." Again: "In about 4 p.ct. of the workrooms the lighting appeared to be insufficient for the purposes required; and in nearly all these cases gas was used as the illuminant." On the other hand, "in many cases glare was present; but it is impossible to give any figures as to the extent of this defect."

* See "JOURNAL," Vol. CLV., p. 319. † *Ibid.*, p. 652. ‡ *Ibid.*, p. 392.

Removing Oil Storage Tanks.

After the war, the Directors of the South Metropolitan Gas Company, being desirous of increasing the creosote storage capacity at Ordnance Wharf, purchased from the Government two tanks which had been in use at the temporary oil station at Hull; and an interesting account of their removal is given in the July issue of the "Co-Partnership Journal," by Mr. R. C. Macdonald, Chief Mechanical Engineer to the Company. The tanks were 80 ft. in diameter, and 30 ft. high, with a capacity of about a million gallons, and were erected on a chalk foundation. Each was surrounded by a retaining wall, which formed a square; the object being to confine the oil to a limited area, in the event of an accident to the tank. It was decided to cut the tanks into pieces suitable for loading into the hold of a steamer, and to employ the Company's own labour in the locality for the work—a course which has been more than justified by the results. A rather novel method for dismantling was adopted; the holder being taken down from the bottom, instead of from the top. The object of this adaptation of the practice in common use on gasholders was to save staging, and to keep the men engaged on cutting-out the rivets as near the ground as possible, thus minimizing the risk of accidents. When the work of cutting-out the rivets on the bottom of the tank was completed, and some of the crown sheets removed, nine derricks securely braced were erected inside the tank, close to the shell plating. The shell of the tank was made up of six strakes of plates about 5 ft. deep. When the derricks were erected, the first circumferential seam of rivets was cut out, and temporary bolts were fitted at intervals. Special bent plates, forming clips, or broad hooks were then inserted on the lower edge of the second strake; and these were connected by shackles to the lower ends of gasholder lowering screws suspended from brackets fixed to the derricks. The weight of the upper portion of the shell was then transferred to the derricks, by taking an equal strain on each screw, and the bottom strake of shell plates was removed in lengths of about 30 ft. As each length was taken away, timber packing was made up to the under-side of the second strake; and as the lowering proceeded, this packing was removed about 3 in. at a time all round. When the shell was lowered 5 ft., a start was made to remove the second strake; and the same method was followed in dealing with this and all the remaining portions of the shell. One strake of plates was removed, and one lowering completed, each day.

THE GERMAN GAS ASSOCIATION.

The Annual General Meeting of the German Gas Association was held at Homburg on June 26, 27, and 28, under the Presidency of Herr Dipl.-Ing. F. P. Tillmetz, of Frankfort-on-Main. We are not yet in possession of the papers which were read and discussed, but a general review of the state of the gas industry in Germany may be gleaned from the reports of the General Committee and the various Commissions. One of the most striking points of the report is, perhaps, the centralization of the various organizations of the German gas industry. All the district associations are directly affiliated with the main body, and the number of adherents was increased during the past year by the admission to membership of the Gas and Water Association of Austria, whose headquarters are in Vienna. The "Zentrale für Gasverwertung" (the equivalent of the B.C.G.A.) is under the same Committee, one member of which manages its activities. The Association is also officially represented on the Committees of the German Society of Technical Scientific Associations and the German Society of Illuminating Engineering. It further controls a valuable experimental and research institution, which is called the "Gas Institute," and which, under the able guidance of Prof. Dr. Karl Bunte, at Karlsruhe, is continually working for, and watching the interests of, the industry in general. Furthermore, it undertakes tests and reports of any kind against reasonable payment, so that any gas undertaking, however small, can have the advantage of expert specialist chemists which it could otherwise perhaps not afford. By means of this branch, the Institute aims at becoming self-supporting.

Difficulties of the Coal Supply.

Having come to the conclusion, states the Committee's report, that the coal situation in the present political state of affairs has little chance of improving, the gas industry has begun to turn its attention systematically to a new order of gas supply, which, though certainly different, need by no means be characterized as "inferior." More attention has to be paid to small savings here and there by means of improved and more careful management; the importance of bye-product recovery and profitable disposal is more than ever obvious; and above all the business and management side of the industry has been forced to the front and largely re-organized. The only notable improvement in the really bad coal position was the removal of the import tax in April, with the result that gas-works could obtain such relief from foreign coal as they could afford to pay for. The only means of meeting the acute coal shortage is by using up their coke and making water gas. Whether or not this is a paying proposition can only be determined by comparing the price of the water gas with that of gas produced from imported coal. At the suggestion of last year's meeting, a number of gas-works chemists had met, and had discussed and published what they considered should be aimed at in present circumstances as regards gas quality. Their ideas, we learn elsewhere, were 450 to 480 B.Th.U. gross per cubic foot at N.T.P., specific gravity not exceeding 0·5, and inerts (CO_2 and N) not more than 15 p.ct. The next problem which faces the industry is to adapt consumers' apparatus to the burning of such gas.

Bye-Products.

The fact that lower calorific value is accepted has made possible a general increase in benzole production, and this is all to the advantage of Germany, whose need for liquid fuel is just as great as her gas-coal shortage. A large number of the gas-works have joined the N.V.G.—an association formed for the marketing of tar products. Without being in any shape or form a ring, the association has been able to be of great benefit to the industry in the organization of sales. Particular attention, in the direction of economy, has been paid to the consumption of steam in ammonia and benzole plant, and in this and many other ways progress has undoubtedly been made. The most important bye-product—coke—has not been neglected, and every effort is being made continually to improve its value to the industry by means of improved quality, careful handling during quenching and transport, and reduction of capital and running charges in connection with the plant.

Plant and Manufacturing Practice.

Economy in gas manufacture has been sought in the direction of the utilization of waste heat of every kind, care in steam consumption, and the separation and use of the combustible constituents of clinker. A general inquiry is shortly to be instituted by the Association among gas-works as to the advantages achieved or to be expected from the central producer system. A general tendency is very noticeable at present towards the adoption of large carbonizing units, and to a development of all systems into the chamber-oven type; in the case of medium and smaller works often, it is suggested, without due consideration to the suitability or otherwise of such systems to their particular circumstances. A noteworthy achievement has been an agreement with the manufacturers as to conditions of guarantee and standards of testing with regard to carbonization plant.

The Gas Institute.

Reference has already been made to this Institution. In its report, it is explained how the Institute has formed a working arrangement with the Karlsruhe Gas-Works, by which the laboratory of the latter has been taken over. By this means, a ready-made and fully equipped laboratory, suitable in size to a large gas-works, has become available for the work and investigations of the Institute, and the gas-works are near at hand for research work to be carried out in actual practice. Among other activities during the year, a "refresher" course for high gas officials was held, when for a fortnight they were given an insight into all that is latest and best in gas practice. Benzole washing has been the subject of much research; and the questions of the use of crude liquor as a fertilizer, and the working-up of liquor into useful products without high-priced sulphuric acid, have received attention.

Corrosion of Pipes.

This is a trouble which seems to be becoming increasingly prevalent of late years in Germany, and the Gas Institute has devoted considerable attention to its investigation. All available samples of rust have been collected and analyzed, and the effect of various impurities on the raw material has been tested. The influence of dryness or moisture in the gas, of the presence of carbon dioxide, ammonia, prussic acid, and sulphuretted hydrogen, and of a simultaneous admixture of tar vapours has been tried. Statistics have been compiled, and the whole subject discussed at a meeting of gas-works chemists. But, as a result of all this, nothing more definite can be stated than that a multiplicity of causes, sometimes working together, sometimes in different ways at different points, give rise to the very serious damage to mains and services which has been experienced. It is obvious that oxygen is the most important factor, and it can be stated with certainty that the action of the oxygen is considerably increased by water vapour condensation. To what extent the hydrocarbon vapours in the gas act as a protection to pipes, and therefore whether the reduction of their quantity by water-gas dilution or by the benzole extraction process gives rise to increased rusting or to accelerated flaking-off of the rust, could not be determined with certainty, in view of differing experience in practice. Probability points to carbon dioxide being of little influence, if not perhaps an influence for good.

Mains and Increased Pressures.

The question of existing mains and higher pressures has been the chief concern during the year of the Commission which deals with mains and services. The matter has become important, as, owing to the reduced calorific value of the gas sold, largely increased quantities have to be sent through the mains, the cost of enlarging which has become quite prohibitive. In some parts, too, they say, the consumption has increased between two and threefold since pre-war days. From experiments conducted some years ago, it was decided that, if pressures be increased to between 4 and 8 in. water column, no increased efficiency in the gas for lighting and cooking purposes is obtained unless special apparatus be used to suit these pressures. A special appeal has, therefore, been made to German manufacturers to concentrate their efforts on the production of burners suited to the higher pressures and the quality of gas to which reference has already been made. It is hoped that there will be results to report at a later date. The Commission have also been at pains to collect data as to the increased danger, if any, that exists with higher pressures in case of leaking mains. The conclusion arrived at is that, when pressures rise through increased quantities being delivered through the same mains, the losses of gas only increase in proportion to the total quantity delivered. In the case of one very scattered district, where the make increased from 24 million cub.m. in 1914 to 73 millions in 1921, the unaccounted-for gas was 10·73 p.ct. in the former year, and 9·35 p.ct. in the latter. During the whole period it averaged about 10 p.ct. In other words, the danger from pressures increased up to the limits stated is negligible, provided proper care and attention are given to the laying and upkeep of the mains. Investigations are being made into the question of friction in pipes, but these are proving a long and rather costly matter. No results are as yet ready for publication.

Accounts Made-out by the Meter.—A recent number of "Das Gas- und Wasserfach" describes an apparatus, invented by Herr Sprinzl, of Vienna, for attachment to consumers' meters, which, when manipulated by the collector, prints the account on the spot. The inventor claims that it can be attached to any meter, and that a simple adjustment enables it to keep pace with changes in gas prices. It consists, mainly, of two parts—the counter, which is permanently attached to each meter, and a printing frame, one of which is carried by each collector. The latter inserts his frame into the counter, and by a series of manipulations of a key, the amount of gas consumed, the sum due, and the consumer's name, his number, and the number of the meter are printed off on the account form which was inserted into the frame, as well as amounts due for meter-rent or other extras. The inventor claims that the mechanism cannot easily be tampered with, or put to misuse, either by consumer or collector. The accounts can be made out in duplicate, and meter-rent and extras are automatically added to the charge for gas. The cost of the apparatus is reasonable; and it can be fixed to any make of meter simply and at small expense. These are only a few of the advantages claimed, apart, of course, from the chief one of the saving of clerical and administrative staff. The inventor hopes to have produced an apparatus answering all the requirements in which previous attempts of the kind have failed.

THE STANDARDIZATION OF GAS-COOKERS.

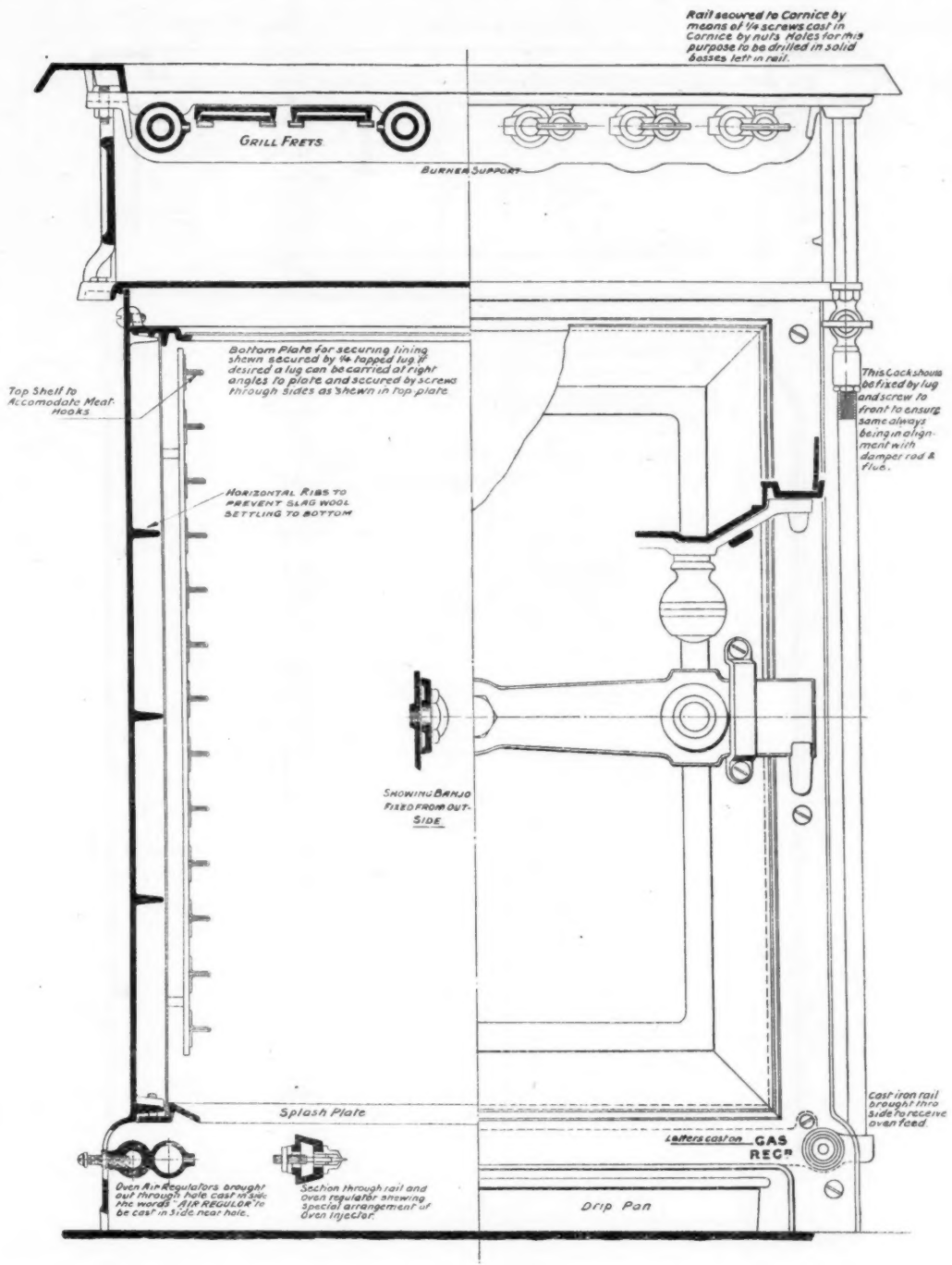
SPECIFICATION OF THE STANDARDIZATION COMMITTEE OF THE NATIONAL GAS COUNCIL.

[Approved and Adopted by the Central Executive Board, May 9, 1922.]

(The Committee's Report will be found in the "JOURNAL" for July 5 and July 12.)

NAMES FOR STOVE PARTS.

Proposed Standard Designation.	Existing Designations.
HOT-PLATE.	
„ Cornice.	Hot-plate frame or hot-plate.
„ Grids No. 1 and 2 left section.	
„ „ 1 and 2 right „	
„ „ 3 left „	
„ „ 3 right „	Cast grids, cast sections, utensil supports, cross-bars, top bars, half sections.
„ „ 4 left „	
„ „ 4 right „	
„ „ 5 left „	
„ „ 5 central „	
„ „ 5 right „	
Cast inserts for straight bars.	
Straight wrought bars.	Cross bars, burner bars, &c.
Hot-plate bridges.	Tcp brackets, hot-plate supports, top supports, &c.
„ cast tap rail.	Feed float, burner float, &c.
„ rail tap complete.	Rail-taps, burner-cocks, grill-cocks, &c.
„ grill burner No. 1 right.	
„ „ „ 1 left.	
„ „ „ 2 right.	
„ „ „ 2 left.	
„ grill frets No. 1 top.	
„ „ „ 1 bottom.	Deflectors, grill-plates, toasters, grill-grids, &c.
„ „ „ 2 top.	
„ „ „ 2 bottom.	
„ grill tins No. 1.	Top pans, grill pans, &c.
„ „ „ „ 2.	
„ „ tin grid No. 1.	Toasters, racks, &c.
„ „ „ „ 2.	
„ burner carriers (various).	Straps, cross-bars, rests, supports, &c.
„ ring burners for:	
Nos. 1 and 2 hot-plates S.1 and 2/1.	
„ „ „ S.1 and 2/2.	
No. 3 „ „ S 3/1.	
„ „ „ S.3/2.	
„ „ „ S.3/3.	
No. 4 „ „ S 4/1.	Boiling-burners, simmering-burners, fish-kettle burners, medium, large, and small burners, &c.
„ „ „ S 4/2.	
„ „ „ S.4/3.	
„ „ „ S.4/4.	
No. 5 „ „ S.5/1.	
„ „ „ S 5/2.	
„ „ „ S.5/3.	
„ „ „ S.5/4.	
„ „ „ S.5/5.	
Air adjuster for ring burners.	
„ grill „	
„ oven „	
Enamelled crown plate.	Loose tray, loose top plate, &c.
OVEN.	
„ Cast crown plate.	Dome plate, oven top, top plate, &c.
„ „ side (right hand).	
„ „ „ (left hand).	
„ „ back.	
„ Front frame.	Door frame, front section, &c.
„ Door.	
„ Cast flue outlet.	Flue nozzle, flue vent, &c.
„ Damper rod.	
„ „ wing.	
„ Supply pipe.	
„ Taps (¼ in. or ⅜ in.).	
„ Door knob.	
„ „ latch.	
„ Inner crown.	Baffle plate, dome plate, or false crown.
„ „ „ support.	
„ Burner shield.	Drips, splash plates, &c.
„ „ (right hand) Nos. 1 to 5.	
„ „ (left hand) „	
„ Injector tube (Nos. 1 to 5).	Oven float, bottom pipe, cross pipe, &c.
„ „ pin and nut.	
„ „ nozzle.	
„ Gate racks.	Gates, gate runners, shelf rests, rack supports, &c.
„ Grid shelves.	Grids, racks, shelves.
„ Enamelled linings (back).	
„ „ „ (right).	
„ „ „ (left).	
„ „ „ (door).	
„ Drip-tin.	Bottom, oven, or drip pan.
„ Browning-shelf.	Browning sheet, solid shelf, &c.
„ Meathook.	
„ Slagwool (for packing).	Silica cotton, asbestos, &c.
„ Base stand plate for No. 1.	
„ „ „ Nos. 2 and 3.	
„ „ „ „ 4 and 5.	
„ „ legs No. 1 (12 in.).	
„ „ „ Nos. 2, 3, 4, and 5 (4 in.).	
„ „ „ „ 2, 3, 4, and 5 (24 in.).	
„ Base stand potrail, No. 1.	
„ „ „ Nos. 2 and 3.	
„ „ „ „ 4 and 5.	


Rail secured to Cornice by means of ¼ screws cast in Cornice by nuts. Holes for this purpose to be drilled in solid bosses left in rail.
GRILL FRETS
BURNER SUPPORT
Bottom Plate for securing lining shewn secured by ¼ tapped lug. If desired a lug can be carried at right angles to plate and secured by screws through sides as shewn in top plate.
Top Shelf to Accomodate Meat Hooks.
This Cock shown to be fixed by lug and screw to front to ensure same always being in alignment with damper rod & flue.
HORIZONTAL RIBS TO PREVENT SLAG WOOL SETTLING TO BOTTOM
SHOWING BANJO FIXED FROM OUTSIDE
Cast iron rail brought thro side to receive oven feed.
Splash Plate
Letters cast on GAS REGR
Oven Air Regulators brought out through hole cast in side the words "AIR REGULOR" to be cast in side near hole.
Section through rail and oven regulator shewing special arrangement of Oven Injector.
Drip Pan

— HALF SECTIONAL ELEVATION —

— HALF FRONT ELEVATION —

STANDARD COOKERS.

SPECIFICATION.

RANGE OF SIZES.

No. 1 for auto or ordinary consumers, with 12 in. base stand (rigid).	Unpacked.
No. 2 for auto or ordinary consumers, with or without 4 in. or 24 in. rigid stands.	Packed or unpacked (see note below).*
No. 3 for ordinary consumers, with or without 4 in. or 24 in. rigid stands.	Packed only.
No. 4 for ordinary consumers, with or without 4 in. or 24 in. rigid stands.	Packed only.
No. 5 for large establishments, with or without 4 in. or 24 in. rigid stands, if required.	Packed only.

*PACKED OR UNPACKED COOKERS.

The No. 2 cooker will be supplied packed or unpacked, and separate body castings, &c., will be produced to enable this to be done, and to meet the requirements of those undertakings who may wish to purchase this size of packed or unpacked stove for auto or ordinary consumers. The door of each type of stove to be packed; the same hot-plate being used.

CASTINGS AND SERIES NUMBERS.

All castings to be clean and of the best quality cast iron, without any extraneous ornamentation (except where shown on drawings). The series numbers to be indicated on all parts of all sizes of cookers.

BASE STANDS.

All stands to be strongly constructed of cast iron (pressed steel may be permitted at a later date after examination, if specially required, as per plans), and all to be of the rigid type.

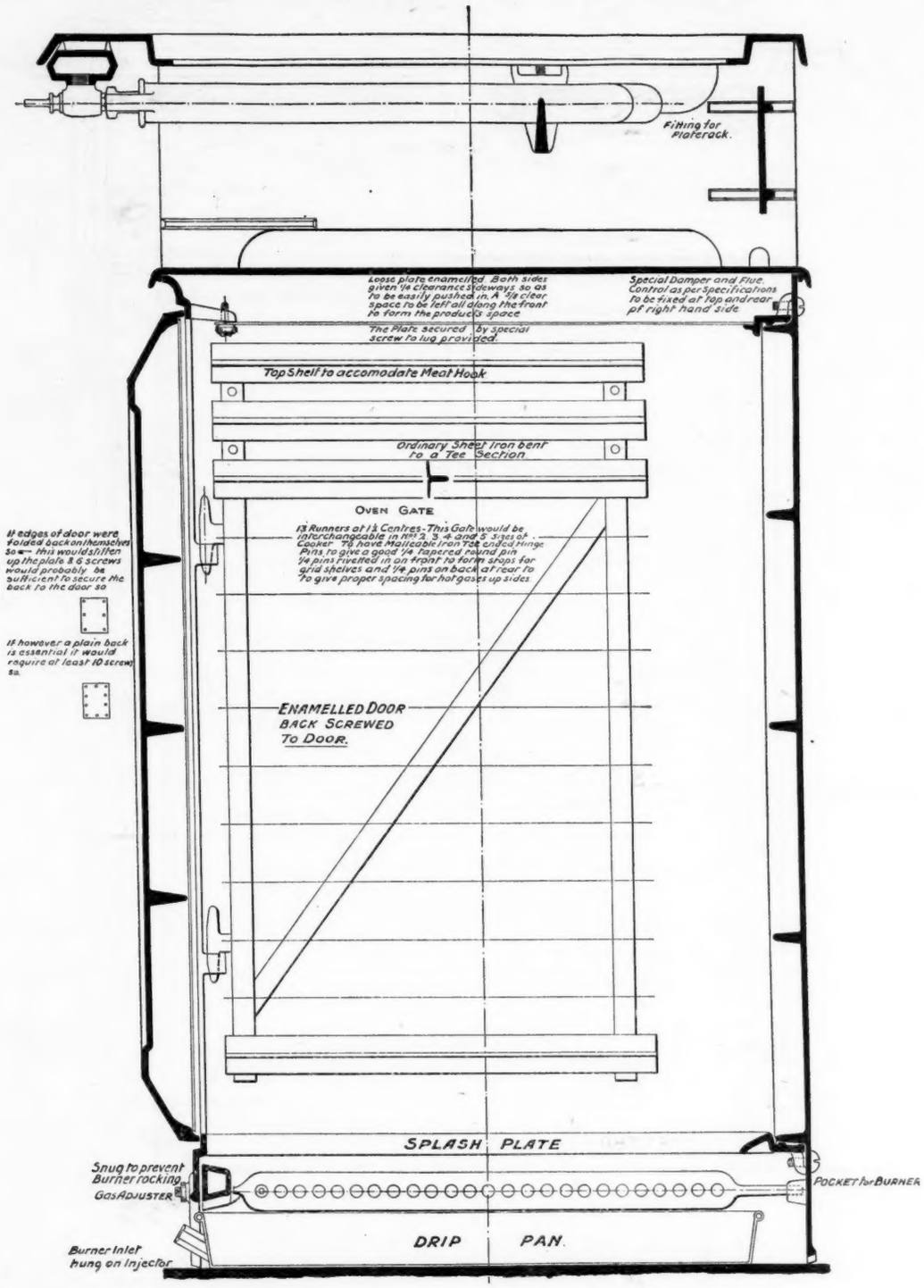
The tops to be cast solid (with no openings); and the legs in all cases to be replaceable. The potrails to the 24 in. stands, to be made replaceable. The cross bars of same to be set at a pitch of 2½ in., and at a height of 9 in. from the floor line.

The stands to accommodate cookers as follows:

No. 1 for the No. 1 cooker 12 in. high over-all.
" 2 " Nos. 2 and 3 cookers 4 in. high over-all.
" 3 " " " " 24 in. "
" 4 " " 4 and 5 " 4 in. "
" 5 " " " " 24 in. "

Clearing holes to be provided towards the back on the top plates, to enable the cooker or cookers to be fixed by means of two small right angle brackets, screws, and nuts.

Clearing holes also to be cast on the top plate of the 24 in. stands, similarly to accommodate the hot-plate (or plates) bridges.


Fitting for Platerack.
Loose plate enamelled Both sides given 1/4 clearance sideways so as to be easily pushed in. A 5/8 clear space to be left all along the front to form the products space
Special Damper and Flue. Control as per Specifications to be fixed at top and rear of right hand side
The Plate secured by special screw to lug provided.
Top Shelf to accomodate Meat Hook
Ordinary Sheet Iron bent to a Tee Section
OVEN GATE
13 Runners at 1 1/2 Centres - This Gate would be interchangeable in Nos 2, 3, 4 and 5 sizes of Cooker. To have Malleable Iron Tee and Eyed Hinge Pins, to give a good 1/4 tapered round pin 1/4 pins riveted in on front to form stops for grid shelves and 1/4 pins on back at rear to to give proper spacing for hot gases up sides
If edges of door were folded back on themselves so as this would stiffen up the plate & 6 screws would probably be sufficient to secure the back to the door so
If however a plain back is essential it would require at least 10 screws as
ENAMELLED DOOR BACK SCREWED TO DOOR.
SPLASH PLATE
Snug to prevent Burner rocking
Gas Adjuster
Pocket for Burner
DRIP PAN.
Burner Inlet hung on Injector

—TRANSVERSE SECTION.—

HOT-PLATE CORNICE.

The hot-plates to be of stout cast iron (as per drawings). The No. 1 hot-plate must fit neatly on to the No. 2 oven, the front of cornice to accommodate the cast tap rail. Bevelled edges at an angle of 45° to be continued around the front and sides only; the front corners to be rounded off slightly. Recesses to be formed only on the front and back inside edges of the hot-plate cornice to receive the cast burner grids.

CAST INSERTS FOR WROUGHT BARS.

Where supplying hot-plates to any gas undertaking, &c., with wrought-iron bars, suitable cast-iron inserts to be provided, to fit neatly into the hot-plate recesses (back and front). The slots as shown in drawing to allow for the accommodation of the existing stock pattern wrought bar.

CAST HOT-PLATE GRIDS OVER BURNERS.

The hot-plate grids are to be of the "open," sectional type (as per drawings), and so formed in depth and width as to give the necessary strength to withstand long, and sometimes heavy, usage.

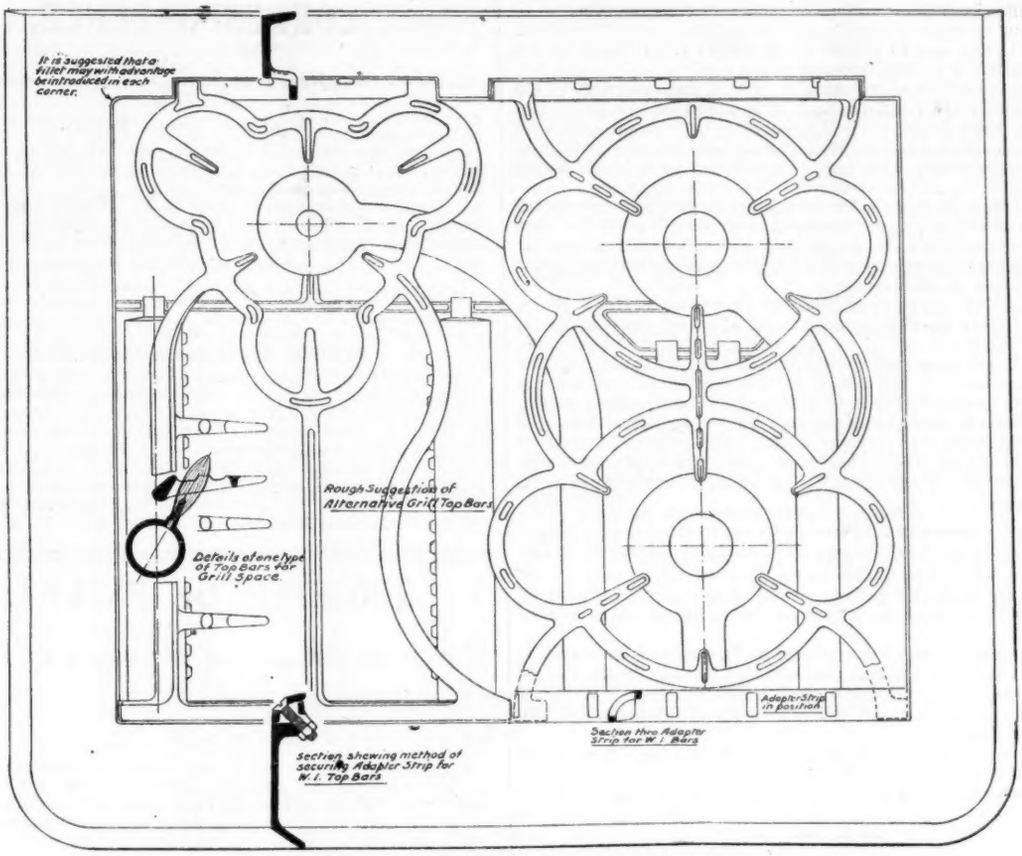
The flame spaces to be as clear as possible; but no opening between the points of any of the top grids shall exceed a 2½-in. circle in diameter, to permit of small utensils being used as required. The flame openings must come directly over the centre of each burner below.

The channelling or ventilating spacings of the cast top grids to be ½ in., in a downward direction, from the under face of any utensil placed above.

The front and back edges of the cast sections to be so formed as to ensure their registering in the cornice perfectly, and prevent their being used in the wrong positions.

HOT-PLATE BURNER CARRIERS.

All burner carriers to be of stout cast iron, and of the removable types with each size of hot-plate, and to be attached to the cornice, underneath, by means of screws and nuts. They must in every case be so shaped as to register correctly and securely all the burners which they are intended to support.


It is suggested that a fillet may with advantage be introduced in each corner.
Rough Suggestion of Alternative Grill Top Bars
Details of one type of Top Bars for Grill Space.
Section thro Adapter Strip for W. I. Bars
Adapter Strip in position
Section showing method of securing Adapter Strip for W. I. Top Bars

PLAN OF HOTPLATE AND TOP BARS.

DIMENSIONS OF COOKERS.

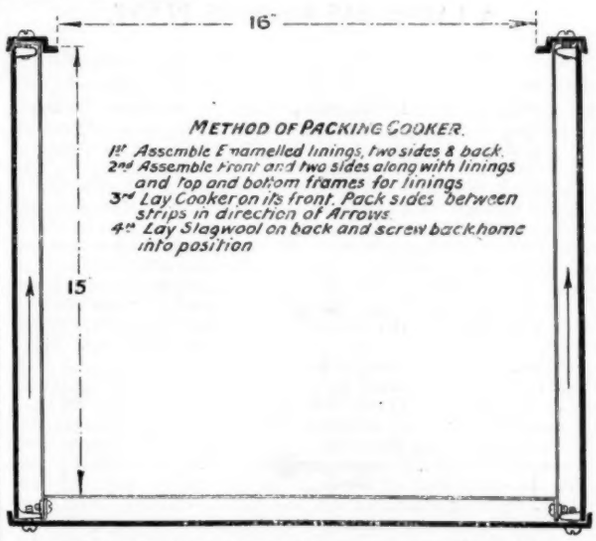
The cookers to be constructed in accordance with the following dimensions and details :

Hot-Plates.

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
WIDTHS :					
Over-all, including chamfer each side	22 in.	22 in.	24 in.	27 in.	30 in.
Actual operating space between inner edges of cornice	17 in.	17 in.	19 in.	22 in.	24 in.
DEPTHS :					
Over-all, including chamfer on front only	18 in.	18 in.	20 in.	24 in.	27 in.
Actual operating space between edges of ½ in. rebates on front and back	12½ in.	12½ in.	14½ in.	17 in.	20 in.
HEIGHT :					
Over-all, from floor line to top level of hot-plate.	24 in.	32 in.	32 in.	33½ in.	33½ in.
Between top of oven and top of hot-plate	6 in.	6 in.	6 in.	6 in.	6 in.
BURNERS :					
No. of 2½ in. size (15 c.ft. per hour)	1	1	1	1	1
No. of 3½ in. size (24 c.ft. per hour)	1	1	2	2	2
No. of 4½ in. size (36 c.ft. per hour)	..	..	..	1	2
GRILLERS :					
Over-all width	8 in.	8 in.	8 in.	8½ in.	8½ in.
Over-all depth	9½ in.	9½ in.	9½ in.	10½ in.	10½ in.
No. of grill burners	2	2	2	2	4
No. of grill frets.	2	2	2	2	4

Ovens.

—	No. 1. Unpacked.	No. 2. Packed and Unpacked.	No. 3. Packed.	No. 4. Packed.	No. 5. Packed.
WIDTH :					
Actual operating space between racks or inner edges of door frame	12 in.	14 in.	16 in.	18 in.	21 in.
DEPTH :					
Between face of back lining and face of door lining	12 in.	13 in.	15 in.	17 in.	20 in.
HEIGHT :					
From centre of burner jets to inner crown face	15 in.	22½ in.	22½ in.	24 in.	24 in.
From lowest grid to inner crown approximately.	12 in.	19 in.	19 in.	21 in.	21 in.
From floor line to level of top crown	18 in.	26 in.	26 in.	27½ in.	27½ in.
From floor line to centre of burner jets	2 in.	2 in.	2 in.	2 in.	2 in.
Inner crown space (approximately)	1½ in.	1½ in.	1½ in.	1½ in.	1½ in.


16"
15
METHOD OF PACKING COOKER.
1st Assemble Enamelled linings, two sides & back.
2nd Assemble front and two sides along with linings and top and bottom frames for linings
3rd Lay Cooker on its front. Pack sides between strips in direction of Arrows
4th Lay Slagwool on back and screw back home into position

SECTION THROUGH OVEN showing method of packing.

HOT-PLATE BRIDGES.

The hot-plate to be supported by two (open type) cast bridges; a stout lug (about 4 in. long) to be cast on the inner side of each, enabling the enamelled crown plate to be drawn out and used as a shelf, when griller is in use. A space of not more than 1 in. to be left at the bottom of each bridge, to extend along as far as practicable.

Two short ribs to be cast on each inner face of the bridges, with square bolt hole centrally formed, so as to accommodate neatly the plate-rack supports. The bridges to be attached to oven crown plate, so as to permit of their being easily removed externally; and the No. 1 hot-plate must also fit the No. 2 oven.

HOT-PLATE BURNERS, AND AIR ADJUSTMENT.

All the burners to be of the loose simplex drilled ring type, according to number and dimensions shown in the table, with substantially cast teats formed on the upper surface for the drilling of $\frac{1}{8}$ in. flame orifices, at a pitch of from $\frac{7}{16}$ in. to $\frac{1}{2}$ in. between each. The teats to be drilled at the definite angle of 30° from the vertical for the inner circle of flames, and 20° from the vertical for the outer circle.

A circular boss to be cast on the side of the mixing tubes of all burners, at an angle of about 45°, either on the right or left hand side, but in any case to permit of regulation from above by the easy insertion of a screwdriver or pliers.

This boss must, in every case, be clear of the inner edge of the front cornice recess, and properly drilled and tapped to accommodate a hard brass regulating screw with locknut, milled on edge, which screw must be threaded sufficiently to enable it to pass completely across the bore of the burner when in the closed position.

A short stout cheese head to be formed to the screw and slotted to permit of proper adjustment by screwdriver.

Each burner tube to be clearly and smoothly venturied as near as possible to the inner edge of the hot-plate recess when the burner is in its proper working position.

The series of hot-plate burners to be known as No. 1, No. 2, and No. 3, the over-all diameters being 2½ in. for the No. 1 size, 3½ in. for the No. 2, and 4½ in. for the No. 3. All to be properly positioned, and supported on the carriers so as to ensure a definite distance of 1¼ in. between the top of the burner and the top of the cast sectional grids. Suitable lugs to be provided on the bottom of the burners to engage the burner carriers. The end of the burner tubes to be formed so as to fit over the injector projections formed on the cocks. No burner to be placed nearer to the inner edge of the cornice than 1¾ in. from the outer edge of the burner.

HOT-PLATE BURNER CONSUMPTION.

The burners when alight must give well aerated flames at the following consumptions, and be capable of adjustment up or down, by the regulating gas-nipple and air-adjuster. The tests to be made with the injector fully open for maximum rates at 2 in. pressure.

No. 1 burner to have a range from 2 c.ft. per hour up to 15 c.ft. per hour without firing-back, so that it can be used for simmering as well as boiling, by turning down the tap.

No. 2 burner, from 5 c.ft. per hour without firing-back, up to 24 c.ft. per hour.

No. 3 burner, from 5 c.ft. per hour without firing-back, up to 36 c.ft. per hour.

The above consumptions are based on gas at 475 B.Th.U. per c.ft.

(To be continued.)

A LARGE GAS-HEATING PLANT.

What is described as the world's largest gas heating plant is dealt with by Mr. Samuel S. Fyfe in the "Gas Age Record;" the installation being at Los Angeles, where the Southern California Gas Company supply gas for steam heating a building of 3 million c.ft. capacity. The system of heating planned was that known as the "Indirect" or "Blast Radiation;" the idea being to draw 122,000 c.ft. per minute of fresh air, by means of a powerful fan, initially through an air washer and humidifier installed on the roof of the building, and discharge same at a point in the basement through the steam-heated plant, and from there into a system of sheet metal ducts designed for the even distribution of the warm air throughout the building. The gas supplied by the Company is a mixture of natural and manufactured gas; the calorific value being 800 B.Th.U. Peerless gas-fired boilers were selected, mainly because of their high and quick steaming qualities. Each of these boilers is connected to an 8-in. local header; and each local header is connected to a main 10-in. header by means of 6-in. return bends. From the main header four 4-in. steam lines connect to the "blast radiation" portion of the arrangement. There are automatic steam valves, which control to any desired degree the temperature of the air passing through the blast radiation. In each wing of the building thermostats are installed. When the temperature of the air passing through the "blast radiation" has reached the required point for distribution through the ducts, the various automatic devices come into play; and the whole or partial shutting-off of any one thermostatic member in the building at once lessens the demand on the boilers, which leads to the automatic shutting-off of one or more boiler units successively. In the event of the outside temperature of the air rising to a point at which added heat is not necessary, the whole of the boilers shut-off, and the system then automatically becomes one of ventilation. Then as the cool of the evening approaches, and it becomes necessary to add a degree of heat to the entering air, the boilers successiveiy cut-in, just to the number that may be necessary. Figures taken out go to show that the cost for a six months' heating season will very closely approximate $1880. The completion and satisfactory putting into operation of this installation is felt to be a very important achievement from many points of view.

Price of Gas at Brighouse.—It was stated in last week's "JOURNAL" that the Brighouse Town Council had approved a reduction in the price of gas by 6d. per 1000 c.ft.; the new charge being 3s. 9d. Mr. C. W. Ward (the Engineer and Manager) has since pointed out that this charge of 3s. 9d. to ordinary consumers is subject to 3d. per 1000 c.ft. discount, and that for industrial purposes a discount ranging from 3d. to 6d., according to consumption, is made. The net charge to slot-meter consumers is 6d. per 1000 c.ft. more than the price to ordinary meter consumers.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Life of Gas-Meters Report.

SIR,—In your current issue, Mr. H. Kendrick, writing on the above subject, says: "With gummy deposits on governor valves, we have had more trouble in the summer."

It would be interesting to know if Mr. Kendrick has made any investigation of the nature of these gummy deposits—whether they are ordinary tarry deposits or of a different nature entirely.

FRAS. C. BRIGGS, Engineer and Manager.

Town of Dudley Gas Light Company,
July 14, 1922.

Avoiding Spontaneous Combustion.

SIR,—On the Continent, patent fuel makers have to store large quantities of coals—more than they would wish. This coal is rather small, and delivered to them very fast. They would not have time to build the pile in flat layers; and the coal cannot be prevented from forming a cone and running down the sides.

They have to keep moving the coals, and so airing them all the time, and preventing heating. I have not heard of fires.

C. DASNIERES, of Toulon.

Upton Road, Bexley Heath, July 13, 1922.

REGISTER OF PATENTS.

Automatically Closing Gas-Supply Services. No. 181,438.

APPS, H. J., of Old Hill.

No. 7199; March 5, 1921.

A possible cause of waste and danger arises in connection with prepaid gas-supply services when the meter valve closes while a burner is in operation. If the burner tap is left open and overlooked, the gas will escape when the supply is re-opened after the insertion of another coin or coins in the meter. The object of the present invention is to provide an improved device which automatically closes the supply when the pressure falls below a predetermined amount, and which must be restored by hand before gas is again allowed to pass.

The invention comprises the combination of a valve container, a projection on the base of the chamber having a gas aperture at its upper end, a valve in the form of a light metal cup mounted over the projection and adapted to close the gas aperture when the gas pressure is insufficient to sustain the valve, a flange formed on the lower edge of the cup, or a ring arranged below its lower edge, and an externally operable stem acting on the flange or ring by which the valve can be raised.

Registering the Flow of Gas.—No. 181,439.

DAVIS, R. H., of Westminster Bridge Road, S.E.

No. 7206; Mar. 5, 1921.

This invention relates to an instrument for registering or indicating accurately the volume of gas flowing through any circuit, of the kind comprising a closed cylindrical chamber free of any dividing partitions and having an inlet and an outlet for the gas, and in which a vane is pivotally mounted on a spindle or pivot coaxial with the chamber and carrying a pointer or needle designed to move over a graduated dial against the action of a spring; the vane being arranged so that its zero position is adjacent to the gas inlet. The gas inlet is positioned so that the entering jet strikes the vane in a more or less tangential direction with respect to the circular path of the vane.

In a suitable arrangement for carrying out the invention, the instrument comprises a casing, having a graduated dial, hermetically sealed in position in the casing preferably by a glass disc, and a vane formed on, or carried by, a disc rigidly secured to a pivot or spindle mounted in a bearing in the dial and an adjustable screw bearing fitted in the base of the casing.

The outlet of the gas is preferably arranged adjacent to the inlet, so that a more efficient whirling motion of the gas and a more uniform graduation of the dial are obtained. If it be desired to arrange the external outlet fitting diametrically opposite to the inlet, this can be provided for by placing such outlet fitting in communication, by an internal passage, with the outlet port in the interior of the casing.

Gas Manufacture.—No. 181,403.

HELPS, G., of Nuneaton.

No. 34,874; Dec. 10, 1920.

According to this invention, coal is first treated in a combined gas producer and retort to produce a rich gas (which is collected) and producer gas, which is then burnt in burners in a setting (separate and distinct from the gas producer) surrounding another coal-retort or other retorts. Preferably the burnt gases are employed for externally heating a plurality of retorts in such a manner that one or more of the retorts is or are less highly heated than the other or others; the gases from a less highly heated retort being led into the top portion of a more highly heated retort.

In lieu of a number of sets working in series, the height of the retorts may be so increased that the products of combustion are cooled sufficiently when two sets of retorts in casings are used, which is referred to later. The retorts are preferably tapered or belled consider-

ably, so that highly bituminous coals may be caused to pass freely through them as they are carbonized. The necessary dampers or valves are arranged for as well as the connections, so as to allow of working the series in any desired order.

The invention, the patentee says, is particularly applicable for use in conjunction with his specification No. 34,875, of the same date, for enrichment of low-grade gas. A producer may be used solely to generate the gas for firing, or the gas from a low-grade plant may be used both for firing and for supplying the gas to be enriched. Any number of retorts may be used and connected together; and they may be in series and worked consecutively, or divided into series and worked in parallel. When the low-grade gas producer is used for providing gas for both firing and for mixing with the rich retort gas, it may be convenient to use it as a pressure producer and not under suction. The mixed gas would be passed direct to the purifying plant and on to the holders ready for distribution.

A plant constructed in accordance with the invention is indicated in the accompanying illustrations (figs. 1 and 2). X is a producer. Air enters at the bottom A and passes through the fuel bed B, forming low-grade gas, which passes upward through the flues C round the retort D. The retort contains coal, which thereby becomes partly carbonized; the rich gases passing off at E. The low-grade gas leaves at the top by the flues F and enters the top of the retort-setting Y. It is there burnt with air at the burners G; and the products pass down the outside of the retort and out at the bottom H, whence they are led to a second setting Z and pass round the retort J, emerging at the top to a suitable chimney K. The coal contained in the retorts Y and Z is gradually carbonized. The rich gases from Z leave the retort J about one-third of the height from the top L, and enter the retort Y at about the same height.

By this method the products of the low-temperature carbonization

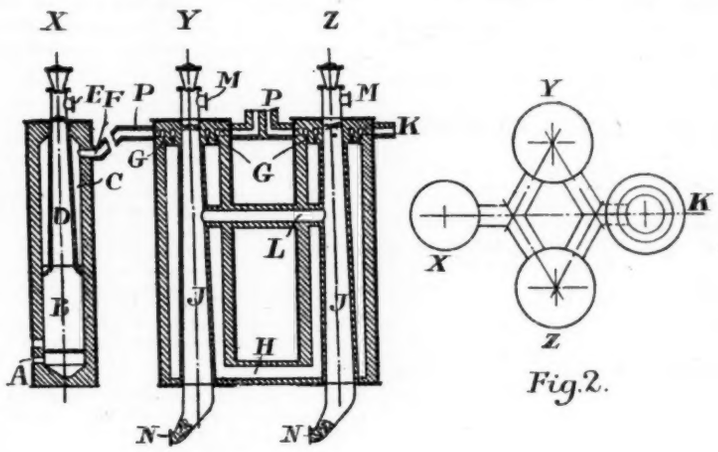


Fig. 1.

Fig. 2.

Helps' Gas-Making Plant.

in Z retort pass through a hot zone in the Y retort, and are thereby fixed. The combined gases pass away at the outlet M, and are mixed with those from E.

When the coal in Y retort is completely carbonized, the process is reversed; Z retort being fired, and Y, recharged with new coal, becomes for the time being the second in the series. Coke is discharged at N, and suitable change-over valves are provided at P.

Fig. 2 shows the plan of such a plant.

Gas Manufacture.—No. 181,404.

HELPS, G., of Nuneaton.

No. 34,875; Dec. 10, 1920.

This invention relates to methods for the enrichment of low-grade gas of various kinds, and the recovery of bye-products from coal or like fuel used for such enrichment. Low-grade gas is passed through incandescent fuel such as coke, and the highly heated gas is then enriched by its passage through a retort containing coal, shale, or like fuel. The coal through which it passes is partially carbonized—in fact, becomes coked to an extent rendering it serviceable for domestic fires, coke stoves, &c. Tar is produced in large quantities. Very inferior coals may be used for the purpose of enriching low-grade gas and recovering tar and other bye-products from them by the above process.

The vessel containing incandescent coke may have ordinary atmospheric or oxygenated air admitted to, or blown through, the coke at suitable intervals, so as to bring it to the necessary high temperature in much the same way as the blow in a water-gas system, or air may be admitted for the same purpose by suction. The waste gases from such blow may be used for externally heating the coal-retorts. There may be a plurality of such vessels, and they may be used in series or in parallel.

The vessel containing the fuel to be made incandescent for heating the low-grade gas may also contain the retort in which the coal is carbonized, so that the retort and superheating chamber are combined in one casing; provision being made for blowing and for the necessary valves or dampers being operated. The superheated gas would enter the retort at one end and exit at the other; a passage being formed for such exit. The retort in which the rich gas is made may be set vertically, or inclined to the vertical, and have attached to it a coke discharging shoot. The blow gases may be utilized for externally heating the superheaters or other serviceable work.

Gas Manufacture.—No. 181,665.

HELPS, G., of Nuneaton.

No. 14,058; Dec. 10, 1920.

This invention relates to the manufacture of gas in a plurality of retorts containing coal arranged in a plurality of separate and distinct settings, while gas from a gas producer is fired in one of the settings and the products of combustion passed through the other setting or settings, each setting being fired in turn. The retorts may be so connected together (as described in specification No. 181,403) that the gases from a less highly heated retort are led into a more highly heated retort at a point near to the outlet therefrom.

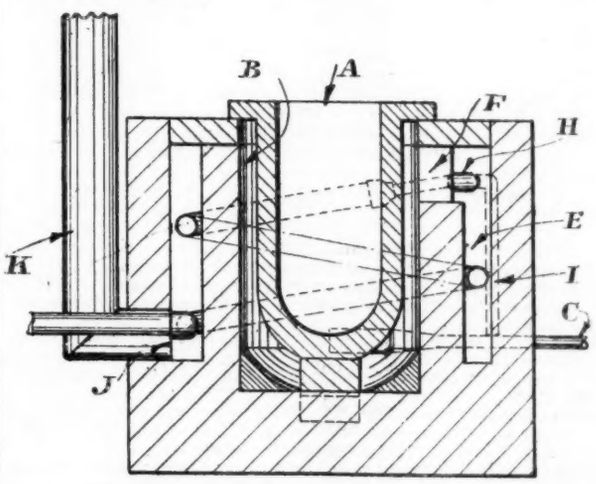
Gas or Oil Heated Furnaces of the Crucible Type. No. 181,452.

STOCKPORT FURNACES, LTD., DUCKWORTH, E., and MEAD, A., all of Stockport.

No. 7482; March 9, 1921.

This invention relates to gas or oil heated furnaces of the crucible type, wherein the combustion products are removed by downward displacement through a spiral tube in the flue surrounding the furnace, and adapted to preheat one or more of the constituents of the combustible gas which descends to the burner through a separate spiral tube within the flue.

The illustration is a sectional elevation of a furnace constructed according to this invention. The crucible A is located in the circular well-like furnace chamber B. The fuel nozzle C, through which combustible gas enters, is arranged (at the lower part of the furnace) so that the fuel or flame is projected into the furnace in a path tangential to the inner wall of the furnace. Concentric with the chamber B is an annular chamber E communicating with the chamber B through an opening F in the dividing wall; a removable cover being provided to enclose the chamber E.



Duckworth's and Mead's Crucible Furnace.

Located in the annular chamber E is a spiral tube H leading from the bottom to the top. Air enters at the bottom of this tube, and, after traversing the same to the top, descends the pipe I to the burner nozzle C. The diameter of the tube H is such as to extend from side to side of the annular chamber E, and thus provide a spiral passage for the waste products of combustion, which, after ascending the furnace chamber with a spiral motion, pass through the opening F and descend

through the spiral flue or passage so formed before escaping through the exit J to the flue pipe K.

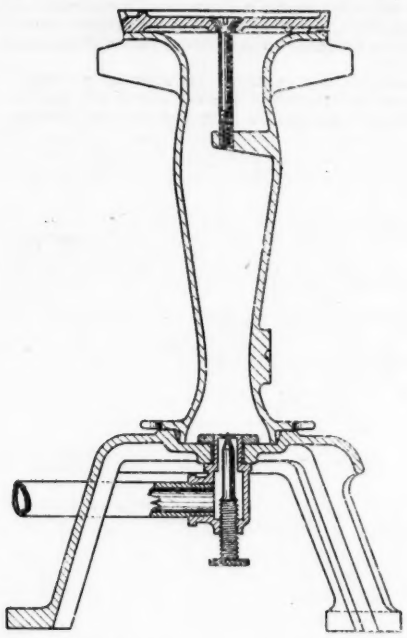
The spiral tube H may be composed of metal or of refractory material; and as the cold constituents for combustion (in the present instance, air) are made to travel in a contrariwise direction to the products of combustion, an appreciable amount of heat is absorbed through the walls of the tube and is thus restored to the furnace, with a resulting economy of fuel and increased efficiency of the furnace.

Atmospheric Burners.—No. 181,655.

Aird, K., and Wortley, G. W., both of Falkirk.

No. 31,494; Mar. 4, 1921.

This invention relates to atmospheric gas-burners for use with wash-boilers, boiling-rings, cooking-stoves, water-heaters, and other heating apparatus. The burner is constructed with the usual inlet and venturi throat and onwards—gradually enlarging internally, again restricting, and then gradually diverging outwardly. Further, the outlet is so shaped that the moving mixture is gradually passed between two annular smooth surfaces which will prevent ripples and eddies and back-firing. A gaseous mixture having a wide range of quality can be consumed; the elasticity of the fluid being always maintained.



Aird's and Wortley's Burner.

The accompanying sectional elevation clearly illustrates the construction.

The burner can be positioned to permit of the gas connection being led in at any angle, and the injector is so placed as to be readily accessible. The burner can be fixed to its carrier or capable of being lifted out, and is of tubular form having a bell or splayed mouthed inlet, and provided with a divergent outlet having a flat top or an annular smooth surface over which is positioned a cover, shaped to correspond and held to the burner by a screw engaging a snug or arm projecting inside the burner tube. The burner fits a recess in the carrier so that it is always properly positioned; and in the centre of the recess or extension the injector is positioned, with the button of the regulator easily accessible.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 12.]

Nos. 18,154 to 18,811.

Adnitt, W. D.—"Gas-cookers." No. 18,291.
Anderson, J.—"Coin-slot closing-devices." No. 18,499.
Anderson, J.—"Prepayment mechanism." No. 18,598.
Anderson, J.—"Indicating-devices for prepayment mechanism." No. 18,599.
Clark, H. H.—"Burners for liquid or gaseous fuel." No. 18,608.
Coley, H. E.—"Cocks and valves." No. 18,535.
Danks, A.—"Retorts for recovery of bye-products from coal, &c." No. 18,165.
Davidson, T. M.—"Retorts." No. 18,457.
Fezer, O.—"Gas-economizing device." No. 18,320.
Fox, J. T.—"Gas density indicator." No. 18,161.
Ges. für Kohlentechnik.—"Separation of ammonia and benzole hydrocarbons from coal distillation gases." No. 18,489.
Gibson, R. K.—"Indicating attachment for gas-meters with combination recording dials." No. 18,658.
Hasted, G.—"Cocks, valves, &c." No. 18,344.
Murray, T. S.—See Coley, H. E. No. 18,535.
Roberts, I. M.—"Globe holders." No. 18,521.
Salerni, E. M.—"Retorts for distillation or heat treatment of carbonaceous, &c., materials." No. 18,390.
Woodall, Duckham, & Jones (1920), Ltd.—"Furnaces for heating hollow cylinders." No. 18,478.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Birmingham Corporation Bill: Reported, with amendments.
Croydon Gas Bill: Returned from the Commons, agreed to, with amendments, which were considered and passed.
Neath Corporation Bill: Reported, with amendments.
Windsor Gas Bill: Read the third time, with the amendment; passed; and returned to the Commons.

HOUSE OF COMMONS.

Progress of Bills.

Ramsgate Corporation Bill: A clause added; amendments made; to be read the third time.
Chester Gas Bill: Referred to the Committee on Unopposed Bills.

Gas Regulation Act, 1920.

A copy was presented of a draft of a Special Order proposed to be made by the Board of Trade under section 10 of the Act on the application of the Borough of Eye.

Public Utility Companies (Capital Issues) Act.

A copy was presented of a report by the Board of Trade under the Act on an application by the Tuxford and District Gas Light and Coke Company.

Imported Glassware.

Major Mackenzie Wood asked the President of the Board of Trade if, in view of the fact that the Committee appointed by him in December last, in connection with domestic and illuminating glassware, reported that serious unemployment was being created in this country by the importation of these goods from Czecho-Slovakia, he would say why the draft Order laid before the House did not coincide with the findings of the Committee, and contained no reference to Czecho-Slovakia.

Mr. Baldwin replied that this was one of the matters with which he proposed to deal when the Order came before the House—before rising for the holidays.

Mr. T. Thomson asked the President of the Board of Trade whether he had any information as to unemployment caused in this country through the importation of opal glass shades for lighting purposes; whether these shades were manufactured in this country on a commercial scale; and, if not, whether he would consider exempting them from the duty proposed to be placed on lighting glassware imported from Germany.

Mr. Baldwin said he had no information as to the unemployment caused by the importation of the special class of shades mentioned in the question. The answer to the second part of the question was in the affirmative, and the third part, accordingly, did not arise.

Gas and Electric Light Prices.

Mr. Lyle asked the President of the Board of Trade the relative prices of gas and electric light in the Metropolitan area now and for the last five years, and whether he was satisfied that they now reflected the decreases in the cost of labour, coal, and materials.

Mr. Baldwin replied that the question of prices charged for electricity was a matter for the Minister of Transport. As regards gas prices, he was having the figures looked into, and would furnish a statement in the course of a few days.

BIRMINGHAM CORPORATION BILL.

The Unopposed Bills Committee of the House of Lords on Tuesday of last week had before them the Bill [see "Journal," Jan. 11, p. 80] to empower the Corporation of Birmingham to make further provision in regard to their several undertakings. The Bill passed for third reading.

LEGAL INTELLIGENCE.

METAL DISCS IN A PREPAYMENT METER.

A Case at Oldbury.

Joseph Chamberlain was before the Oldbury Magistrates last week, on a summons for stealing a quantity of gas of the value of 18s., the property of the Urban District Council.

Mr. F. Dawes, prosecuting, said that at the request of the defendant a shilling-in-the-slot meter was fixed at his house; but when the collector went to collect the money from the meter, he found 7s. and 18 metal discs, which had been used in place of shillings. Defendant was written to a month later and admitted having put the discs in the meter, because he was short of money at the time. He intended to redeem them when the collector called, but was unable to do so.

Defendant told the Court that he did not put what he called "megs" in the meter with the intention of stealing the gas; but he was out of work at the time, and had his child ill.

Mr. Dawes said the Gas Committee regarded the case as a serious one; and though they did not wish to press it against the defendant, who had been put to considerable expense in attending the Court,

as he had obtained a situation in Wales, they wanted the case to be a warning to people who had slot-meters that this kind of thing could not be allowed.

The Magistrates, while accepting defendant's story that he had no intention of stealing, dealt with him under the Probation Act, and gave warning that anyone else coming before them on a similar charge would be severely dealt with.

Failure of a Gas-Mantle Company.

The Official Receiver in the Companies' Winding-Up Division of the High Court of Justice has now issued his observations under the liquidation of the Richmond Light Manufacturing Company, Ltd., of No. 90, Cannon Street, London, E.C., from which it appears that the gross liabilities in regard to creditors amount to £3629, of which £1856 is expected to rank against the estate for dividend. The net assets amount to £1730; but they are all absorbed by the claims of debenture holders, so that there is a deficiency of £1856. With regard to contributories, the paid-up capital of the Company is £1785, to which has to be added the above deficiency of £1856, making the total deficiency £3641. The Winding-Up Order was made on July 26, 1921, on a petition presented by a creditor on June 21. The Company, which was promoted by J. J. Fordham and Herman Victor Fabini, was registered as a Private Company on Dec. 1, 1919, with a nominal capital of £2150, divided into 2000 preference shares of £1 each (10 p.ct.) and 3000 ordinary shares of 1s. each. It was formed for the purpose of carrying on business as manufacturers of incandescent mantles, burners, &c. The failure of the Company is attributed to heavy overhead charges and to foreign competition.

Gas-Mantle Agent's Failure.

At the Bankruptcy Buildings, Carey Street, W.C., on Monday of last week, the first meeting of creditors was held of Edward William Lowe, late of No. 15, Morley Road, East Twickenham, now or lately carrying on business as Douglas Thomas & Co. at No. 35, Craven Street, Strand, commercial agent. It appeared that about 1910 or 1911 the debtor started trading in London under the style of Douglas Thomas & Co., as a commission agent and broker; and latterly he had principally dealt in gas-mantles. His liabilities (apart from a sum of £1500 due to a relative) were in respect of an action he brought to recover damages for breach of contract in regard to a delivery of mantles. He had stated that he lost the action on a technical point. He put his liabilities at £1630; and his assets were estimated to produce about £2. The estate was left in the hands of the Official Receiver.

MISCELLANEOUS NEWS.

BACK TO THE BONUS.

The following remarks by the President (Dr. Charles Carpenter) appear in the July issue of the "Co-Partnership Journal" of the South Metropolitan Gas Company:

The second half of this year will be notable in the post-war records of the Company as witnessing the restoration of the bonus. From the 1st of July all co-partnership agreements will carry with them the right to a share in whatever surplus profit may be available for division, after meeting our obligations, up to the closing of the Company's books at the end of the year. That profit, it will be remembered, is to be divided equally between the shareholders and the employees, proportionately in the one case to their stock, and in the other to their wages. It is not in any way a reflection on our business that both parties of our co-partnership have had to wait for nearly four years from the signing of the Armistice before again becoming participators in the profits accumulating after capital and labour have been credited with their respective wages. To have spoken of any period since the outbreak of war—eight years ago—as being prosperous, would have been a misnomer, bearing in mind the high price of gas. In these circumstances, it would have been unfair to ask the consumers to provide a penny more payment for their gas than would suffice to pay standard wages and interest. Better times are now at hand; and the advantages of lower-priced gas will be shared, not only by the public, but by those who have helped to make this possible.

In making a comparison with the days before 1914, one of the changes to be observed is the slow increase in the amount of stock held by the employees. The reasons for this are twofold. In the first place, no co-partnership bonus has been credited for five years; and in the second place, many new men have entered the service of the Company to fill vacancies caused by war and other losses. It is to be hoped that the coming years will see an extension of the practice of saving and investing in the stock of the Company. The greater the holding of the co-partners becomes, the greater the influence they can exercise in the Company's affairs, with which their own interests are bound up.

To many employees, therefore, a new era in their employment is commencing. They might do much worse than follow the example of the old co-partners, who put their savings and bonus into stock until the aggregate realized a considerable figure. Saving is one of those habits which cannot be practised too early in life; and every facility is given for the regular deposit of small amounts, which total to appreciable figures as the money is left to accumulate. Stock in the Company can be purchased at any time without the formality of going direct to a stockbroker. All that is necessary is to write to Mr. Frank Day, the Secretary, who will see that arrangements are made for the transfer.

It is not easy to find adequate expression of the pleasure the announcement as to the bonus gives me. The co-partners, like the shareholders, have been most patient in very trying circumstances. It will not be long before they commence to reap the reward to which they are so justly entitled; and I hope the bonus additions to wages and interest will continue and increase for many years to come.

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Ilkley Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15d. per therm. (July 11.)

Rowley Regis and Blackheath Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 17·2d. per therm.

Prepayment meter clauses are included. (July 11.)

Sevenoaks Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18·2d. per therm; and this price shall be substituted for the price of 6s. per 1000 c.ft. mentioned in section 48 (limiting the price of gas) of the Sevenoaks Gas Act, 1876; and the price of 17d. per therm shall be substituted for the price of 5s. 6d. per 1000 c.ft., and the price of 17·6d. per therm shall be substituted for the price of 5s. 9d. per 1000 c.ft. mentioned in section 48 of the Sevenoaks Gas Act, 1876. (July 11.)

DECLARATIONS OF CALORIFIC POWER.

Matlock and District Gas Company.—500 B.Th.U. (Sept. 30.)
New Hedon Gas and Coke Company, Ltd.—500 B.Th.U. (July 31.)
Pontypool Gas and Water Company.—450 B.Th.U. (Sept. 30.)
Wellington (Somerset) Gas Company.—500 B.Th.U. (Sept. 30.)

REPORTS ON OFFICIAL TESTINGS OF LONDON GAS.

For the Quarter ended June 30.

The following reports for the past quarter of the official testings of the gas supplied by the Companies named have been received from the Gas Referees—Prof. C. V. Boys, Mr. W. J. A. Butterfield, and Dr. J. S. Haldane. All the Companies fulfilled their statutory obligations.

The Gas Light and Coke Company.

[The Company were required to supply gas of an average calorific value of not less than 475 B Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 4·75 therms) for the period April 1 to June 14 inclusive, and of not less than 500 B.Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 5 therms) for the period June 15 to 30 inclusive.]

The average calorific value for the period April 1 to June 14 inclusive was 477·5 B.Th.U. gross, and for the period June 15 to 30 inclusive was 506 3 B.Th.U. gross.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

South Metropolitan Gas Company.

[The Company were required to supply gas of an average calorific value of not less than 550 B.Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 5½ therms) for the period April 1 to June 16 inclusive, and of not less than 560 B.Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 5·6 therms) for the period June 17 to 30 inclusive.]

The average calorific value for the period April 1 to June 16 inclusive was 558 B.Th.U. gross, and for the period June 17 to 30 inclusive was 564 4 B.Th.U.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

Commercial Gas Company.

[The Company were required to supply gas of an average calorific value for the quarter of not less than 475 B.Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 4·75 therms).]

The average calorific value for the quarter was 497·6 B.Th.U. gross.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

South Suburban Gas Company.

[The Company were required to supply gas of an average calorific value for the quarter of 460 B.Th.U. gross per cubic foot (at which value 1000 c.ft. are equivalent to 4·6 therms).]

The average calorific value for the quarter was 484·7 B.Th.U. gross.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

EUROPEAN GAS COMPANY, LTD.

The Annual Meeting of the Company was held on Tuesday of last week, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. H. E. JONES in the chair.

The GENERAL MANAGER and SECRETARY (Mr. F. Eliot Williams) read the notice convening the meeting and the statement of accounts. The Directors' report was taken as read.

THE DIVIDEND AND PROSPECTS.

The CHAIRMAN said it was with a great deal of personal satisfaction that he rose to address the shareholders on this occasion, as compared with his feelings at the meeting a year ago, when he had to come to them with what was for him always a melancholy story—that of no dividend. He thought they were to be congratulated upon learning from the report that the Directors were recommending a final distribution of 2½ p.ct., which would make a total dividend of 5 p.ct. for the year. Of course, 5 p.ct. was nothing very great; and they were accustomed for many years to get much more than this. But it would be remembered that they went down from 10 to 7½ p.ct., for three years the Company paid 5 p.ct., for one year 2½ p.ct., and for the following year nothing. In the year in which the distribution of 2½ p.ct. was made, however, the Directors did not realize—so rapid was the fall in the rate of exchange—that all possibility of anything but a very serious loss was gone, because they were paying for coals and material in England in sterling, and were reaping their harvest in France in francs, at a depreciation of 63 p.ct. The shareholders knew that he was an old Manager of gas-works; and all the other members of the Board were accustomed to deal with problems such as had cropped up during the war, in consequence of the high prices of coal and labour, &c. Even with the assistance of that grand institution the sliding-scale, they were still left with very small dividends to pay. But to be confronted with such a proposition as faced their Company—paying for things by one standard, and getting their return in something quite different—was a new experience, and a ghastly one. But the whole war was ghastly; and this was only one experience added to others.

NO AMALGAMATION.

Their Company had been the subject of certain notices in the Press which the Directors could not understand; and they had had to warn certain correspondents and the Stock Exchange that there was no scheme on hand for amalgamation with any other undertaking. In fact, he did not believe there was anybody quite good enough to be amalgamated with them; but when any suggestion of the kind did come along, the Board would be very pleased to give polite attention to it. Now, this 5 p.ct. dividend had been gained; and how had it been got? It had been very dearly won, with great effort.

HELP OF THE FRENCH AUTHORITIES.

They had heard him speak on past occasions of the just practices and wise action of the French authorities, and the way in which they had helped the Company gradually to face the difficulties of the situation; but the Government had to realize for themselves—and they did so—that they must help the gas companies all over France, or that the gas must go out, and the whole thing come to grief. Therefore the Government very wisely took the matter into consideration, and appointed a Committee representing the French Home Office, the Ministry of Public Works, the Ministry of Reconstruction, and the Ministry of Finance. They sent down recommendations to the Prefects that something must be done to help the gas companies, or the gas-works could not be kept going. The Committee suggested two alternative schemes. The first of these was that the accounts of the previous year should be gone into, and that for the following year the price of gas should be regulated on the basis of the actual cost of the previous year, with an addition to enable a reasonable profit to be made. The alternative plan provided for the fixing of a price beforehand as the basis for a sliding-scale, on a definite scheme of co-efficients relative to the actual cost of material and labour and the revenue derived from bye-products; and ultimately this was what they settled upon. This latter was much the more direct scheme, and came to them quicker than the very slow action of the British Parliament over here. It was also the cheapest process. In France, it was a fairly speedy one; but it was not so speedy as the deterioration in the value of the franc, and this was what for a time overwhelmed them. But accompanying this recommendation, the Committee suggested that an opportunity would be presented, when renewing these arrangements, for the authorities to make the best bargains they could with the concessionaires; and naturally, when an efficient mayor and his corporation got to work, with professional assistance, they found lots of things they would like to have out of the Company in exchange for what they themselves were giving. The shareholders could easily imagine what this meant to the Directors, ably seconded as they were by the new General Manager and the staff in his office. They were confronted with many propositions. They supplied eight different towns and authorities, with many more communes; and all had their own separate ideas and views. The staff, both in England and France, had had to contend with all the different points raised, in the settlement of which, naturally, the vendors of the gas viewed matters a little differently from the buyers of it. The work at the London office had been enormous. Most of those present would remember the placid, peaceful times of steady operations and good returns. These times had suddenly gone from them; and now it had been a great struggle to secure even a moderate dividend of 5 p.ct., which was not the value to the shareholders of their money to-day. Quite recently the Company were paying their bankers something in the region of 7 p.ct., when the shareholders were getting nothing; and when they received circulars from auctioneers and others, they would find many of the smaller undertakings in England (and some of them having the added value of supplying water as well) had had to raise money at 7 p.ct. So he did not hold out to them that 5 p.ct.—even with the Company paying income-tax, which was a point not to be lost sight of—was what might be called a "fat thing" in London to-day. As he had already said, it had been got only with much hard work and enormous anxiety on the part of the Board and the chief officials; and their cordial thanks were due to the officers and staff for the enormous amount of extra work they had accomplished. The Directors had thought it only right that they should not leave this extra work unremunerated. Accordingly they had, so far as the concessions in France had been settled, and generally in the office in England, given bonuses on a sufficiently liberal scale to assure, he thought, their acceptance in a grateful spirit.

LOOKING AHEAD.

The position was that they must go on. The Directors were going to get the shareholders more than 5 p.ct. They meant it. In some shape or other, they ought to make good to the shareholders the vacuum of that unfortunate year in which they paid no dividend at all. There was such a thing as back dividends; and he was sure the French consumers would not grudge giving them something in this way. But the time for this was not yet. They had to work for it; and they meant to get it. With a continuance of the same fair play on the part of the French authorities which they had experienced from them during the last few years, he was convinced that this expression of hopefulness on his part would not be neutralized. The decrease of 17·3 p.ct. in the sale of gas which was reported a year ago (as compared with 10½ p.ct. increase for the year before that) was partly compensated for by an increase of 4·43 p.ct. in the year under review; and the object of the Board was to further stimulate the sales. In this direction they were already putting their shoulders to the wheel; and their able General Manager had formulated a scheme of propaganda, following on the lines by which the use of gas was being so rapidly extended in England for all sorts of domestic and utilitarian purposes formerly disregarded. In addition to this they were exhibiting appliances which made the capabilities of gas for domestic and utility service more manifest in all the towns they supplied. On the occasion of a recent visit by the Directors to the various stations, he was very pleased to see that the Managers were taking this matter up, and keeping the showrooms in better order and the goods more prominently displayed. The Directors found all the works operating better, and everything tidier. It could be imagined what they looked like at the end of the war, with labour scarce and material impossible to obtain; but they were now getting things back into order, and this must inure to their better fortune as shareholders. The report told them that the Board were still negotiating with regard to some of the towns. It was not an easy matter at all; but it had really been "boiled down" to a very small point. They had not yet quite succeeded in getting either Havre or Nantes—their two largest stations—settled; but they had got very near to it; and hoped soon to put things there on a permanent footing, so that they might be able to reckon on what they were going to get in the future in the way of a return. But the steps taken by the Government had enabled them to supply both these places at prices not unremunerative, though they were far from being on the lines the Directors would like to see permanently established. The report also dealt with the state of efficiency of the plant. They were getting on now with various replacements which were not previously possible, with the prices charged and the difficulties encountered in obtaining materials. These replacements were rendered necessary not so much by the things being worn out as through their having been outgrown by the progress of the Company. It had, of course, not been possible to do much to the works for the last eight or nine years. This must inure, again, to their future benefit. Finally, the report told them that the Company were going to shift their London offices. Rents were going up; and they had been able, with the assistance of one of their staff, to secure the freehold of Montague House, Devonshire Square, E.C. It was a very good house, and was now being repaired at a moderate cost. It had been secured very cheaply indeed, having regard to its position.

THE PREPAYMENT METER SYSTEM.

Referring again to propaganda work, he might remark that they had derived formerly enormous advantages from the system which, by the wisdom of Mr. Williams's father, was introduced many years ago of supplying gas through prepayment meters; but during the war it was impossible to work this system, and at present these meters were operating as ordinary meters. As soon, however, as things once more became stable, the Company would derive great benefit from this system, especially at Nantes, where previously it did not exist at all. The wider introduction of prepayment meters and the pushing of the sale of gas for various domestic purposes were two means by which they were sure the sale of gas in two or three of their towns would be largely increased; and to secure this increase would be their aim.

AN APPEAL TO THE SHAREHOLDERS.

Now, he was going to make an appeal to the shareholders on a matter upon which he felt very deeply himself; and this deep feeling was shared by his colleagues on the Board, who had been round the works, and had incidentally viewed some of the devastations in France—some of the cities laid waste by the Germans. He was going to ask the shareholders to allow the Directors to give, in the name of the proprietors—not as coming from the price of gas, but out of possible profits they might in future days divide—a small contribution of 10,000 frs. to each of their six towns to be devoted to the restoration of the devastated areas in France. This, he thought, was the least that they, as an English Company trading in France could do, with a knowledge of the terrible misfortunes which had overtaken that country. The contribution would not be a large one individually; but he did not want to minimize the gift by saying that the shareholders would not feel making the gift. They had, however, such enormous resources that this would be but a drop in the ocean. What he did wish the shareholders to do was to show their sympathy with France in the misfortunes that overtook her, when she was attacked so ruthlessly, so wickedly, and with such fiendish ingenuity—when her towns and various buildings were thrown to the ground, and her workshops barbarously dismantled, so that they could never be of use to the poor people whom the enemy had ejected. The determination appeared to be to say to France, with the foulest possible malignity: "We want to crush you; but if we do not crush you, we will take care you have nothing left to go back to, and that you shall not be able to make your living if you beat us and we have to retire." The sum which he

asked them to contribute would amount at the present time to about £1200. He was sure of the support of the shareholders in this. [Applause.] With these words, he would ask them to signify their approval of the position of their undertaking by voting for the motion that the report and accounts now submitted be received and adopted. Before, however, putting the resolution to the meeting, he would be only too pleased to answer any questions. Having spent three or four days on the accounts, he thought he knew everything from "A to Z," as his manner was.

Dr. CHARLES CARPENTER formally seconded the motion.

The CHAIRMAN, replying to a question, stated that every variation of 1 fr. to the pound sterling made a difference to the Company of about £3000. The whole of the operations of the Company—having regard to the kind of coal to which they had been restricted until quite recently—had been conducted with the usual skill and efficiency by their foreign staff.

The motion was then carried unanimously.

THE DIVIDEND.

The CHAIRMAN next moved: "That the interim dividend of 5s. per share paid on Feb. 1 last, less 4d. per share for duty in respect of all shares held in France, is hereby confirmed. That a final dividend for the year ended March 31 last at the rate of 5s. per share be now declared—such final dividend on all the shares of the Company to be paid on Aug. 1 next, the whole out of interest and profits and free of income-tax, subject, however, to a deduction for French stamp and transfer duty of 4d. per share in respect of all shares held in France."

Dr. CARPENTER seconded this, and in doing so said he would like to express his own feeling and what he was sure was the feeling of his colleagues—that was, their gratitude at the warmth of the shareholders' response to the Chairman's proposal to make a contribution to the various French towns the Company served with gas.

The motion was agreed to.

RE-ELECTIONS.

Dr. CARPENTER said the duty and pleasure now fell to him of proposing the re-election as a Director of Mr. Harry Jones. The ability of Mr. Harry Jones was known to all of them, but to none, perhaps, so well as to him (the speaker). He could say that he was not only a good administrator, but a good engineer, a good financier, a good diplomatist, and a good fellow. The affairs of the Company were very safe in his hands; for he had a master mind.

Mr. JOHN MEWS, in seconding, declared that Mr. Harry Jones was the man in the whole world for them.

The resolution was carried with applause, and

The CHAIRMAN, in acknowledgment, said he loved the work so much that even if they did not pay him for it, he would want to do it just the same.

Dr. CARPENTER said his next duty was one almost equal in pleasure to the last. It was to propose the re-election as a Director of Mr. Frank H. Jones, who was the worthy son of an able father. His qualities were most valuable at the meetings of the Board, and no less on the tours they had to make from time to time to inspect the various works in France. Much of what he had said with regard to Mr. Harry Jones was true also of Mr. Frank Jones.

Mr. W. G. BRADSHAW said the shareholders would understand the gratification he felt in seconding this, when he told them that Mr. Jones's grandfather and his own grandfather had worked together for many years; Mr. Jones's father and his own father had worked together; and now he had the great pleasure of working with Mr. Jones. Any company which had the benefit of Mr. Frank Jones's services was in a fortunate position.

The resolution was cordially agreed to, and acknowledged by Mr. JONES.

The Auditors (Messrs. G. C. Goldsmid and W. B. Brady) were also re-appointed on the proposition of Mr. H. S. REESON, seconded by Mr. J. RONCA.

A VOTE OF THANKS.

Mr. A. F. PHILLIPS said he would like to have the pleasure of congratulating the Directors upon the successful year's working, and also to thank them for the services they had rendered to the Company. He himself, of course, had some slight knowledge of the difficulties that had to be contended against in negotiating alterations in concessions; and the Company's staff had his full sympathy in this matter. He knew it often took a month to carry through negotiations with one single municipality; and that the Company should have been successful with all their municipalities except two, really showed an extraordinary amount of intelligent devotion and aptitude for the work. He proposed that the best thanks of the meeting be given to the Chairman, Directors, and staff for their services during the past year.

Mr. A. M. PADDON, in seconding, said they would all agree that a tribute coming from Mr. Phillips with regard to the overcoming of Continental problems and difficulties was a compliment worth having.

The vote was accorded with acclamation.

The CHAIRMAN said he was glad the staff had been included in the vote, because both abroad and at home they merited thanks in the highest degree. The Company had been exceptionally fortunate in securing a line of heredity in the selection of a new General Manager. Perhaps he ought not to call him "new," because he was three years old that day. [Laughter.] Mr. Williams had displayed in his work accomplishments and zeal and a knowledge of business which were admirable; and the same remark might be made with regard to the whole of the staff in London. Throughout it was an exceedingly good one. They were all first-rate linguists, and all familiar with French customs (which was very necessary in a Company like theirs); and they were all capable and devoted. With regard to the Directors and the Managers in France, they were all stalwarts. There was recently an "invasion" of England by French gas engineers; and the number included the staff of their Company. The Directors took advantage of their presence with other members of the Société Technique de l'Industrie du Gaz en France to offer them some entertainment, which they seemed to have enjoyed very well. It was a great pleasure to the Board to see how well the members of their staff stood among their professional *confrères*. [Applause.] He had often spoken in past years of the competence of their French engineers, and was glad to be able to do so again. They had all been through anxious times; and their new Managing Director stepped into the position just when the greatest fire was being directed upon it—when they were in the throes of the aftermath of the great war. His colleagues felt, as he did, heartily grateful for all the support they had received during the time of trial.

Mr. F. ELIOT WILLIAMS said he wanted, on behalf of all the members of the staff and himself, to thank them for their vote, and the kind words that had been spoken. Everyone connected with the Company felt a great deal of gratification that the work they had done now led to the Company being put on a much more satisfactory basis. It was very disheartening to have to work without paying a dividend. They hoped now that a start had been made again in this respect to go ahead steadily and more than maintain the distribution that the meeting had just agreed to.

RADIATION FIRMS ANNOUNCE A FURTHER REDUCTION IN PRICES.

The following communication has been received from Radiation Ltd.:

The policy of Radiation Ltd. since its formation has been to effect reductions in the selling prices of gas apparatus as speedily as possible. The elimination—by combined effort—of competitive outlay has already enabled the firms constituting Radiation Ltd. to make reductions considerably in advance of equivalent reductions in prices of materials and costs of labour. In fulfilment of this purpose, therefore, they are glad to be able to announce a further reduction in prices of all listed gas-stoves, which will take the form of altering the present discounts off current list prices from 20 p.ct. to 25 p.ct., or in the case of radiators from 30 p.ct. to 35 p.ct.

With regard to goods which are sold at net prices—such as slot cookers, &c.—these have already been the subject of special heavy reductions during the current year; and these goods, therefore, do not fall within the scope of the present reduction.

In making this announcement of a further reduction in prices, the opportunity is taken of reminding customers of the substantial rebate terms which were given last January, along with the reduction of prices then made; and the time is probably now sufficiently advanced to enable gas undertakings to form an approximate estimate of the value which this rebate will represent by the end of the year.

IMPORT DUTY ON GAS-MANTLES.

The Board of Trade have announced that importers of gas-mantles are to declare the description of the mantles according to the following classification, which determines the percentage of the value upon which the 33⅓ p.ct. import duty under Part I. of the Safeguarding of Industries Act is to be levied.

Bijou, 12 p.ct.; medium, including medium Graetzin, 13⅓ p.ct.; "C" (upright), universal inverted Graetzin, and 300 c.p. inverted low pressure, 15 p.ct.; high-pressure upright and high-pressure inverted (collodionized), 24 p.ct.; soft mantles (upright and inverted) low pressure, and soft mantles, inverted, high pressure, 45 p.ct.

Mantles not included in the above scale will be released on payment of a deposit of duty calculated on 45 p.ct. of the invoice value.

FINANCIAL STATEMENT AT OSSETT.

The annual financial statement of the Ossett Corporation gas undertaking, submitted last week, showed a gross profit of £7919; but as interest and sinking fund charges amounted to £12,249, there was a net deficit of £4330 on the year's working. The three months' coal stoppage cost the undertaking an extra £8000; but in view of the poor condition of the town's trade during the great slump, the Committee did not increase the price of gas above 5s. per 1000 c.ft. The sale of gas was 6 million c.ft. more than in the previous year, and a little more than the record figure of 1915.

During the year the scheme of obtaining coke-oven gas from Crigglestone, at 9d. per 1000 c.ft., had been put into operation; and the work of laying the special main was done by the department, at a cost of £4000 less than the lowest tender. This provided work for the unemployed. The scheme would save 10,000 or 12,000 tons of coal a year; and the coke-oven gas could be bought more cheaply than the Council could make gas. There were no residuals produced at the works now; but arrangements had been made to keep customers supplied. The price of gas was reduced to 4s. per 1000 c.ft. in April; and the output could be as much increased as necessary. Labour cost had been reduced to a minimum; but capital charges remained.

It was hoped to reduce the deficit very materially by next March, though a saving of £13,000 would be necessary to give them a clear balance-sheet.

The report was adopted after some appreciation and criticism.

Cheaper Gas at Hastings.—In making the announcement of a further reduction in price by the Hastings and St. Leonards Gas Company, as from the Midsummer meter readings, to 1s. 1d. per therm, Mr. C. F. Botley (the Engineer and General Manager) points out that this is equivalent to 4s. 11·8d. (say, 5s.) per 1000 c.ft., and makes a total reduction of 1s. 3d. per 1000 c.ft. this year. In regard to this new price, he adds, consumers are requested to note the leading factors in the position. Coal is less expensive, being now 75 to 80 p.ct. above pre-war cost; oil is approximately double pre-war cost; the return from residuals is not proportionately so advantageous as in 1914; labour costs are still up 102 p.ct. in comparison. The declared value of the gas (on which the consumer pays) is 460 B.Th.U. The gas supplied during the past half year has averaged 468 B.Th.U.

BRENTFORD GAS COMPANY'S WAR MEMORIALS.

Impressive ceremonies accompanied the unveiling, on the 9th and 12th inst., of memorials at Brentford and Southall to the men of the Brentford Gas Company who fell in the war.

At the Brentford works on Sunday, the 9th inst., the actual ceremony was associated with a solemn and affecting service in the Church of St. George, which was formally and entirely placed at the disposal of the Works Committees of the Staff for the occasion, and was filled in every part some time before the hour appointed for the devotions with which the memorable proceedings commenced. The Directors of the Company present were: Mr. R. J. Neville Neville (Chairman), Dr. Page, General Cowie, Mr. D. Milne Watson, Mr. H. E. Griffith, and Mr. W. Mann. The officials included Mr. Alex. A. Johnston, J.P., C.C. (Engineer and General Manager), Mr. H. Mann (Secretary), Mr. R. Goodman (Deputy Engineer and Manager), Mr. P. Perry (Works Engineer), Mr. A. H. C. Hughes (Superintendent, Rental Department), Mr. F. H. G. Morris (Works Engineer, Southall), Mr. P. Hornby (Assistant Engineer), and Mr. Wingfield (Chief Inspector). Others noticed were Mr. Alan Johnston, Mr. William Edgar, Colonel H. Bott, Mr. T. W. T. Clarke, the Rev. Walter Hawkins (Minister of the Wesleyan Church, Brentford), Alderman Forrester Clayton, J.P., Mr. W. H. Mills (Chairman of the Brentford District Council), Alderman Perkin, J.P., Mr. A. S. Ruston, Mr. W. J. W. Westlake, and Mr. C. Turner. A detachment of the Middlesex Regiment, under the command of Captain Parminter and Lieutenant Somers, was present, who, headed by their band, marched from Ealing to take part in the service. Colonel Murray-White, D.S.O., represented the full regiment.

Mr. R. J. Neville Neville, speaking from the pulpit, called the attention of those present to a few facts which showed the part the Brentford Gas Company had taken in connection with the war. The number of men engaged at the works was about 1050; and the number who served was 497—practically one man in every two in the Company's employ. The number of commissions gained was 29, and the honours 15. The number who laid down their lives to defend those at home was 62. Those who to-day remained would probably remember having seen on some of the shells which helped them in their endeavours to win the war the mark of the Company; for not only the men responded to the call of the country, but the Company helped the Government in every other way they could. They supplied 26,000 18-pounder shells, and laid down plant which enabled them to manufacture toluene, benzole, and chemicals which were needed. They were enabled to do this largely owing to the manner in which the Company received help from outside. When the gallant lads were called away, former employees, old servants and pensioners, came eagerly forward to fill the places thus rendered vacant, and many women too offered their services; and all these were gratefully and promptly accepted. He read out the names of the heroic dead, and said these names would ever remain green in the memory of all.

The congregation subsequently took up positions in front of the memorial on the north wall of the Company's works. The military having formed in line, the relatives of the dead were given a place in front; and after the roll of the drums Mr. Neville performed the unveiling ceremony, amid reverent silence. The "Last Post" was sounded, the Benediction pronounced by the Rev. W. Hawkins, and the stirring "Reveille" followed; the ceremony closing with the National Anthem, played by the band. Numerous beautiful wreaths and crosses were placed at the foot of the memorial, which remained draped with the Union Jack.

The memorial itself (which was designed by Mr. W. B. Lewis, a member of the staff of the Company) has a grey granite border, and the centre is a cast bronze tablet. It bears the inscription arranged as under:

In Proud and Grateful
MCMXIV. Remembrance MCMXVIII.
of our Comrades in these Works
who during the Great War
Laid Down their Lives
For us and for their Country.
(Hear appear the names)
"Greater Love Hath no Man than this."

At the Southall works, the memorial tablet (similar in character to the one just described) is placed in a prominent position just inside the entrance. The unveiling took place on Wednesday, the 12th inst., amid just as impressive a scene as that above recorded. Mr. Neville Neville unveiled the memorial in the presence of a large gathering that included relatives of the fallen and pensioners and employees of the Company. Work ceased for the time, in order that the workmen and staff might be present. Many of the ex-service employees wore the medals or ribbons they had gained in the war.

An impressive and moving service commenced with the singing of the hymn, "Fight the good fight with all thy might." Led by the Brentford Gas-Works (Southall) Prize Band, the assembly joined feelingly in the singing. Mr. Neville Neville then unveiled the memorial; and, following an interval of silence, came the rolling of the drums and the sounding of the "Last Post" by drummers and buglers of the 8th Middlesex Regiment. Wreaths were afterwards laid at the foot of the memorial. The first was placed by the Chairman of the Company on behalf of the Directors and shareholders.

Hemsworth Gas Prices.—It was reported at a meeting of the Hemsworth (West Riding) Urban District Council last week—Mr. J. Garbett presiding—that three months ago the Council appealed to the Hemsworth Gas Company for a reduction in the price of gas supplied to householders. The Chairman stated that a representative of the Company had informed him that it was unreasonable to expect a reduction in the price so long as the Council owed money to the Company. He (the Chairman) said he was told that the Council owed the Company nearly £200; and if this were so, it certainly "looked a bit cheeky" on their part to ask for a reduction in price.

HEREFORD GAS UNDERTAKING.

A statement of the accounts of the Hereford gas undertaking was presented to the City Council recently, which showed that the income for the year amounted to £60,073, compared with £61,684 in 1921. The expenditure was £61,121, against £54,963. The loss (before meeting interest and loan repayments) was £1048, compared with a profit of £6721 a year ago. Receipts from prepayment meters were over £1000 more than in the previous year. The principal items of expenditure which showed increases included coal, purifying materials, salaries, and repairs and renewals of meters. According to the report of the Gas Manager (Mr. Arthur Roberts), the output last year was a record—being 183,315,000 c.ft., an increase of 7,752,000 c.ft. on 1921.

Alderman Witts (the Chairman of the Gas Committee) moved a recommendation to reduce the price of gas from 5s. 2d. to 4s. 8d. per 1000 c.ft. as from June 24. He said that the policy of the Committee during the thirty years he had been connected with it had been in the first place to make ends meet, then to keep a certain amount in hand, and then to make no more money, but to reduce the price of gas. If the Council wished (keeping the gas at its present price during the next three years), they could build up a reserve fund of £30,000. But this was not his policy. He preferred to reduce the price to the consumers; and as long as he was Chairman of the Committee this policy would be followed. During the past year, the accounts showed a loss of £1048, which, however, would not fall upon the ratepayers, but would come out of accumulated revenue. The Committee were left with a balance on revenue account of £5490. Regarding the capital account, this showed that in their works they had property to the value of £175,449, which had been built-up during the last thirty or forty years. The only loans that were outstanding upon the property, together with creditors, amounted to £46,735, which included a holder that the year before cost £20,000. So that, taking out the loans and charges upon the works, they had property of the net value of £128,714. He hoped later on to announce a further reduction in the price of gas. Whenever they could afford it, the Committee were going to give back to the consumers some of the money they had had from them. The Committee had gone through a hard time; but he thought they were absolutely safe now.

SMETHWICK GAS UNDERTAKING.

The annual statement of accounts in connection with the gas undertaking was submitted to the Smethwick Town Council recently.

The new Chairman of the Gas Committee (Mr. S. W. B Stephen), in presenting the report, said the actual loss was shown in the statement as £2265. This was rather illusory, because it did not reveal the exact deficiency for the year. They would observe that the credit balance at the commencement of the year was £8354. This was now changed to a debit balance of £2265; so that the net loss for the year was £10,619. Though this looked black, it was not so unsatisfactory an experience as in some other towns in the Midlands, where much heavier losses had been sustained. There was, however, one gratifying feature of the accounts—the reference to the leakage of gas. The percentage of loss had this year been reduced to 4·44, against 8·92 in the previous year. The leakage this year was the lowest on record since the concern had belonged to the Corporation. This meant a saving to the undertaking of £6500. Mr. Stephen called attention to the fact that the production of gas was only maintained with the greatest difficulty; and in order to carry on, and to eke out stocks, they had to buy fuel of inferior quality at exorbitant prices. In addition to the extra cost of manufacture, there was (owing to the depression in trade) a decrease in the consumption of gas of over 10 p.ct. As to the question of residuals, the sales showed a decrease for the year of over £30,000. This was a very large sum, and was accountable in great measure for the loss they had made. Ammoniacal liquor, which in the previous year brought in almost £7000 actual profit, was valueless; while tar was down nearly £7000. Notwithstanding all these things, they were beginning to see daylight; and when the new retorts came into operation, they would get very much better results. He incidentally mentioned that the Committee had now an application from one firm for a very large quantity of gas, which in itself—if they could come to terms—would mean a very much greater output. Finally, he said, in presenting his first report, he was sorry he had to chronicle a loss; but the difficulties of the past year had been such as to be almost insurmountable, and such as the Gas Committee could not prevent.

Mr. Betts complimented the Chairman of the Committee upon the lucidity of his statement, and advocated further consideration for the prepayment meter consumers, who accounted for 40 p.ct. of the gas. The report was adopted.

It has since been arranged that the prepayment consumers shall receive a discount of 10 p.ct. at each collection.

Brighton Gas Company's Co-Partnership.—Mr. A. M. Paddon (the Chairman of the Brighton and Hove General Gas Company and of the Co-Partnership Scheme) presided over an attendance of about 500, at the first annual meeting in connection with the Company's co-partnership scheme. The report stated that the amount allotted to the co-partners (being 10 p.ct. of the dividends and interest paid by the Company for the year ended Dec. 31 last) was £6591. Purchases of the Company's stock had been made on account of present and future investments of co-partnership money; £5535 of the original ordinary stock and £2955 of "A" ordinary stock having been acquired at a cost of £9632—the Company having advanced the necessary sum to meet the stock purchased in excess of the amount allotted. The co-partners participating in the last allotment numbered 783. All the eligible employees have become co-partners, a result which the Committee regard with satisfaction. Mr. Paddon congratulated the co-partners on the results of the period covered by the accounts. Mr. C. H. Rutter (Engineer and General Manager, and Deputy Chairman of the scheme) and Mr. E. L. Burton (Secretary to the Company) also spoke

ACCRINGTON GAS BOARD REPORT.

A Loss on the Year.

In the annual report of the Accrington Gas Board, Mr. A. J. Harrison (the General Manager) attributes the loss recorded on the year to the coal strike and the payments made for works extensions from which no advantage has so far been reaped. He also emphasizes the fall in the price of residuals.

The loss on the year reached £29,965, bringing the total deficit to £33,375. The expenditure was £8637 more than in the previous year, and the income £17,277 less. After referring to the losses sustained through the coal strike and the depreciation in the price of residuals—estimated to represent £28,000 of the £29,965—the report adds that delay in the completion of the new carbonizing plant had resulted in additional loss. The total distribution costs were £10,451, an increase of £987, due to the enormous amount of work undertaken on main and service repairs. "Even this outlay," adds the report, "has made little impression upon the serious condition of the mains, service-pipes, and meters." Gas unaccounted for totalled 15 million c.ft., equal to 12·34 p.ct.—"a most unsatisfactory and disheartening return," says Mr. Harrison, "having regard to the enormous expense and work put into this department. It has been discovered that the station meter at Accrington has not been registering correctly; and the one at Great Harwood is in a deplorable condition. It is most disheartening that almost every week has brought trouble of this kind. I must repeat that there was not a single piece of plant, from retort to gasholder, but what was in a dilapidated condition and has either had to be replaced, or a considerable sum of money spent upon it to put it into a fair state of repair, or gas making could not possibly have been carried on up to the present." As an illustration, the report quotes a batch of 403 meters examined, out of which 219 were found not to be registering; while 52 were registering over 5 p.ct. slow—making 67 p.ct. of the batch defective. The magnitude of the task was emphasized by quoting the number of meters in use in the district—nearly 22,000. Many hundreds of service-connections needed renewing and many pipes enlarging. An endeavour was being made to re-organize completely this department; but as there were many pipes in use of which there appeared to be no record, the task was a long one.

Describing the past year "as the most disastrous yet experienced," the report states that gas charges to-day stand at 76 p.ct. above pre-war, while for a long time the materials used and the labour were over 300 p.ct. above the pre-war level. In their district, it was necessary to go back to 1906, when gas was reduced 2d. per 1000 c.ft., at a time when a satisfactory reserve was being accumulated. From that time the profits and the reserve, up to 1912, were taken to make up the deficiency on the water undertaking—a sum which would to-day have shown the concern in a much better light, and not one without any reserve and a worn-out plant and distributing station. Expenditure out of capital on new works and mains during the year was £55,877, making the net unredeemed capital £434,453.

The report states that the progress made with the Great Harwood works has not been satisfactory. The carbonizing plant, which was to have been ready for testing by September, was not completed before March, owing to deliveries being held up through industrial troubles. Now, however, the whole of the plant is working satisfactorily. The cost of production is also being reduced; and in a year's time it is hoped to record a different state of affairs. "I am a confirmed optimist that the present year will see a turn for the better," adds Mr. Harrison.

STOURBRIDGE GAS DEPARTMENT ACCOUNTS.

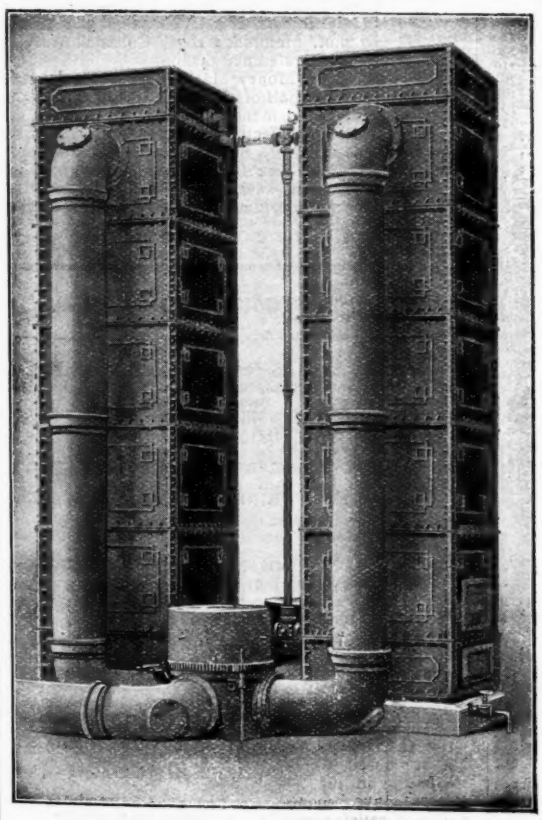
Mr. Charles H. Webb, M.Sc., Engineer and Manager of the Borough of Stourbridge Gas Department, in his seventeenth annual report, says the coal strike has affected the accounts in various ways. The sale of gas shows a decrease of about 14 million c.ft., mostly due to the strike, though the state of trade has been bad through the whole of the year. The gas unaccounted for has been reduced by nearly 1 million c.ft.; and the percentage figure is now 5·01.

On revenue account, the expenses have decreased owing to reduced production of gas and the falling market in raw material. The income is also reduced, but not in the same ratio, as the price of gas, which was not varied during the year, was higher than that of the previous year. Coke realized about £6000 less than previously, tar produced about £2500 more, and sulphate of ammonia £1300 less. The balance carried forward to profit and loss account was £18,548, an increase of £3006. This balance was subject to income-tax, annual instalments, expenditure on mains, services, meters, and cookers, and sinking fund charges on the new vertical retort loan. The effect of these charges is that the surplus for the year is £3164, being a decrease of £158 upon the previous year.

The capital expenditure on mains, services, meters, and cookers continues to be heavy, due to the rapid progress of the housing schemes in the gas area, comprising Stourbridge (Heath and Grange Estates), Pedmore, Hagley, Clent, and Lye. With the exception of the last named, on which very little work has been done, these are well advanced, or almost completed. There are still a number of cookers to be fixed.

The contract made with the Woodall-Duckham Company was completed during the year; and the vertical retort installation commenced work on Feb. 3. At the time of writing the report, it was giving very satisfactory results.

The working statement shows that the make of coal gas per ton of coal carbonized was 13,437 c.ft. The net proceeds of residuals on the cost of coal and oil was 55·12 p.ct.



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STOCK MARKET REPORT.

THE Stock Exchange markets reopened last week still under the gloomy influence of the foreign exchanges; but they began to amend on Wednesday, and on Thursday they brightened up on the lowering of the Bank rate. Most Home Government issues recovered their losses; and the big four on Friday marked: Consols 58½-58$\frac{13}{16}$, War Loan 99$\frac{15}{16}$-100$\frac{3}{16}$, Funding 87$\frac{7}{8}$-88½, Victory 89¾-90$\frac{5}{8}$. Indian, too, rallied. Home Rails wound up with several gains; but Argentines were weak.

The Foreign Market was down till Friday, when Brazil, Chile, Chinese, and Japanese revived.

Business in the Gas Market was a moderate average in point of activity, but was rather humdrum when compared with the remarkably buoyant weeks enjoyed of late. Movements in quotation were not universally in the upward direction; but those which were downward were not of any magnitude. The increases were: Lea Bridge 5, Gas Light debenture 1, South Metropolitan preference and debenture 1 each, and Alliance debenture ½. The falls were Imperial Continental 3, and Gas Light ordinary and maximum 1 each.

The following transactions in gas during the week were recorded: On Monday, Bournemouth "B" 9$\frac{15}{16}$, 10, Gas Light ordinary 95, 95¼, 95½, 95⅝, 95¾, 96, 96¼, 96½, ditto maximum 65, ditto preference 78, 78½, 79, ditto debenture 62½, 63, 64½, Imperial Continental 160, 160½, 161½, Primitiva 15s. 6d., ditto preference 41s. 3d., Sheffield "C" 94⅜, South Metropolitan 96⅛, 96⅜, 97, 97½, 97⅝, ditto 6½ p.ct. debenture 105½, 106½, South Suburban 99½, 100, Swansea 7 p.ct. preference 102½, 102¾, ditto 6½ p.ct. debenture 104, 104¼. On Tuesday, Alliance and Dublin 60$\frac{15}{16}$, Gas Light ordinary 95, 95¼, 95⅜, Imperial Continental 159, 160, Primitiva 16s., ditto preference 41s. 10½d., South Metropolitan 96½, 96⅝, 97½, South Suburban 99½, 100, Romford 4 p.ct. debenture 73½, 74, ditto 4½ p.ct. debenture 82½, 83, Waltham Abbey and Cheshunt 7 p.ct. "B" 5$\frac{13}{16}$, ditto 7 p.ct. "C" 5$\frac{13}{16}$, £5 18s., Colonial Association 14s. 6d. On Wednesday, Bombay 4⅜, Bournemouth 11⅜, ditto preference 8½, Commercial 4 p.ct. 93½, ditto 3½ p.ct. 93½, ditto debenture 57½, Continental Union preference 56, European 12⅜, 12⅝, 12¾, Gas Light ordinary 95, 95⅜, ditto maximum 63, 64½, Imperial Continental 159, 159½, Primitiva preference 40s. 7½d., 41s. 3d., 42s., South Metropolitan 97½, Swansea 7 p.ct. preference 102½, ditto 6½ p.ct. debenture 104¼, Brentwood 10 p.ct. 71½, 72. On Thursday, Alliance and Dublin 61¼, Brentford "B" 93½, 94½, British 30¾, 31½, Continental Union preference 57, European 12⅛, Gas Light ordinary 95, 95⅜, 96, ditto preference 78⅜, 79, Hornsey 117, 118, Imperial Continental 159, Primitiva 15s. 9d., ditto preference 40s. 7½d., 43s., South Metropolitan 97⅜, Swansea 7 p.ct. preference 103, Walton-on-Thames and Weybridge 7½ p.ct. debenture 101½, 101⅝. On Friday, Alliance and Dublin debenture 61½, 62, 62½, 62⅝, Brighton and Hove ordinary 121, Cape Town preference 6¼, 6⅜, Commercial 4 p.ct. 94, ditto 3½ p.ct. 93, Continental Union 37, European 12⅛, 12¼, 12$\frac{5}{16}$, 12⅜, Gas Light ordinary 95½, 95⅝, 95¾, 96⅜, 96⅝, ditto preference 78½, 80, ditto debenture 62½, Imperial Continental 157, 158, 160, Primitiva preference 42s., South Metropolitan 97, 97⅜, ditto 3 p.ct. debenture 61½, ditto 6½ p.ct. debenture 106, South Suburban 98, 101, Tottenham "B" 99½, 99⅝, Croydon 7 p.ct. preference 100, 100½, Folkestone 59½, 60, Holyhead and North Wales 4s. 3d., Liverpool 7 p.ct. preference 107½, Colonial Association 7 p.ct. preference 14s. 9d.

In the Money Market, the general tone for the first half of the week was firm in response to a fair demand; but any tendency to tightness was effectually disposed of on Thursday, the 13th inst., by the lowering of the Bank of England rate from 3½ p.ct. (which had lasted only four weeks) to 3 p.ct. Discount rates were proportionately relieved. Silver fell ⅛ to 35¾d.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Mch. 15	4	4%	Aldershot 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Apl. 12	2½	3$\frac{5}{16}$%	Alliance & Dublin Ord.	59—64	60—65	60$\frac{15}{16}$—61$\frac{1}{16}$
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65*	61½—62⅝
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5¼—6¼	4¼—5	4¼
100,000	5	Feb. 23	16	7½%	Bournemouth Gas and Water { 5 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	..	11—12	11¼
383,110	10	,,	7	7%		15—15½	9—10	9$\frac{15}{16}$—10
115,000	10	,,	6	6%		13½—14	8—9	8½
162,065	—	June 29	—	4%		..	63—68	...
992,045	Stk.	Feb. 9	14	56/-	Brentford A Consolid.	261—266	90—95	...
734,920	,,	,,	11	55/-	Do. B New	204—209	9—95	93½—94¼
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	80—85	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	73—78	...
214,775	,,	Mch. 15	11	11½%	Brighton & Hove Orig.	208—213	165—170	...
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	118—123	121
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	29—31	30¼—31½
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	76—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1½—2½	6¼—7¼	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	6¼—7¼	6¼—6⅜
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
137,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	Mch. 15	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	91—96	93½—94
360,000	,,	,,	5½	38/4	Do. 3½ p.c. do.	103—105	92—97	93—93½
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	57½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—42	37
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	56—57
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	200—210	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	160—170	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	12—13*	12⅜—12⅝
16,298,975	Stk.	Feb. 23	4/17/4	46/8	Gas Light and Coke { 4 p.c. Ord. / 3½ p.c. max. / 3 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds	98—102	95—97	95—96⅝
2,600,000	,,	,,	3½	35/-		76—79	63—66	63—65
4,062,235	,,	,,	4	4%		96—99	77—81	78—80
4,674,850	,,	June 15	3	3%		72½—74½	62—65	62½—64½
130,000	,,	Dec. 11	10	10%		..	..	...
82,500	,,	Sept. 14	5	3½%	Hastings & St. L. 5 p.c.	..	78—81	...
258,740	,,	Mch. 15	3½	2½%	Do. 3½ p.c.	87—89	60—63	...
70,000	10	May 18	11	5%	Hongkong & China, Ltd.	16½—16¾	6—7	...
86,600	Stk.	Mch. 15	9	9½%	Hornsey 7 p.c.	..	115—120	117—118
131,000	,,	,,	7½	7½%	Ilford A and C	151—154	120—130	...
65,780	,,	,,	6½	5½%	Do. B.	115—118	100—110	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	73—78	...
1,976,000	,,	May 18	9	5%	Imperial Continental	150—160	157—162	157—161½
404,800	,,	Feb. 9	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	74—79	...
235,242	,,	Mch. 15	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	88—93	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A. / B.	211—213 / 146—148	.. / ..	... / ...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,	Feb. 23	7/5/6	6%	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	47—50	...
75,000	5	,,	6	6%	Malta & Mediterranean	4¼—4½	3¼—3½	...
250,000	100	Apl. 3	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	91—98	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11½—12	63—68	...
1,875,892	,,	Feb. 23	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	83¾—84¼	...
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	68—70	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12¼—13	...
55,940	10	Mch. 15	7/14/0	10/13	,, ,, 7 p.c.	14—15	10½—11½	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	92—97	...
60,000	5	—	10	—	Ottoman, Ltd.	7¼—7½	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Mch. 15	13	62/6	Portsea Island, B	128—131	87—90	...
100,000	50	,,	12	57/6	Do. C	118—121	78—83	...
249,980	5	—	8	—	Primitiva Ord.	5½—6	⅞—1	15/6—16/-
499,960	5	—	5	—	Do. 5 p.c. Pref.	4¼—5	2—2½	40/7½—43/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	74—76	...
600,000	Stk.	Jan. 26	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	...
150,000	10	Mch. 30	6	6/-	San Paulo { 6 p.c. Pref. / 5 p.c. Deb.	10½—11	5¾—6¼	...
125,000	50	July 3	5	5%		47—49	35—38	...
135,000	Stk.	Mch. 15	10	5%	Sheffield A	223—224	93—95	...
209,984	,,	,,	10	5%	Do. B	222—224	93—95	...
523,500	,,	,,	10	5%	Do. C	220—222	93—95	94¾
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	June 29	9	7½%	South African	10½—11½	7—9	...
6,609,895	Stk.	Feb. 9	5/4/0	5%	South Met. Ord.	111—113	96—99	96½—97¾
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96*	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64*	61½
224,820	,,	Feb. 23	8½	8½%	South Shields Con. Stk.	157—159	109—111	...
1,087,795	,,	,,	6	5½%	S'th Suburb'n Ord. 5 p.c.	114—116	98—103	98—101
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	93—98	...
647,740	,,	May 18	5	5%	Southampton Ord.	99—102	70—75	...
121,475	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	Feb. 23	—	7½%	Tottenham District { A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	112—117	...
782,275	,,	,,	6	5½%		115—117	98—103	99½—99⅝
181,255	,,	June 15	4	4%		87—89	75—80	...
184,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mch. 15	5	3½%	Tynemouth 5 p.c. max.	108½—109	71—73	...
30,000	,,	Mch. 15	8½	66/3	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	110—115	...
255,636	,,	,,	6½	51/3	Do. B 3½ p.c.	129—134	95—100	...
108,075	,,	,,	—	46/4½	Do. C.	..	85—90	...
140,863	,,	,,	—	46/4½	New Ordinary	..	85—90	...
352,000	,,	,,	6½	45/-	Wimbledon 5 p.c.	117—122	92—97	...
98,000	,,	,,	6½	50/-	Epsom 5 p.c.	121—126	95—100	...
88,416	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

* Ex Div.

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EAST GRINSTEAD GAS AND WATER COMPANY.

ISSUE OF £10,000 6 PER CENT. REDEEMABLE DEBENTURE STOCK, REDEEMABLE AT PAR ON THE 31st DECEMBER, 1932.

THE Directors of the East Grinstead Gas and Water Company are prepared to receive Applications for the above-named Redeemable Debenture Stock at par.

£10 per cent. to be paid on Application.
40 per cent. to be paid on or before 1st September, 1922.
50 per cent. to be paid on or before 31st October, 1922.

Interest at 6 p.ct. will be paid half-yearly, on 1st January and 1st July.

Copies of the Prospectus and Form of Application can be obtained at the Office of the Company.

By order of the Board,
D. T. LIVESEY,
Secretary

Gas and Water Office,
London Road, East Grinstead,
July 18, 1922.

14-16, COCKSPUR STREET,
LONDON, S.W. 1.,
10th July, 1922.

To the Shareholders of

LOW TEMPERATURE CARBONISATION, LIMITED.

PROGRESS REPORT.

DEAR SIR OR MADAM,

We have the pleasure in setting out below a progress report which we have just received from Low Temperature Construction, Limited, the Company formed by Close Brothers and Co., in March, 1921, in order to complete and operate the plant at Barnsley.

TO THE BOARD OF LOW TEMPERATURE CARBONISATION, LIMITED.

DEAR SIRS,—In answer to your request we beg to report as follows:

(1) After nearly a year's trial, the 20 retorts at Barnsley continue to turn out from coal slack the Smokeless Fuel "Coalite" and the resultant oils—"Coaline"—even more efficiently than when a report was sent to your shareholders on 3rd November. The "Coalite" produced has been readily sold to some 2200 customers at prices in excess of those obtained for the best domestic coal.

As you are aware, the commercial value of this fuel has now been established by the fact that one of the leading coal distributers of the country has just signed a contract with your Company to purchase, at prices equal to those prevailing for best domestic coal, the whole of the output of "Coalite" up to 250,000 tons per annum for the next five years.

The crude oil obtained, on investigation by chemists, is proving very valuable. The entire output of this oil obtained from the Barnsley Works has been sold at one shilling a gallon. The buyers have offered to take at this price at least 200,000 gallons, with options on much larger quantities. But in the Balance-Sheet now furnished to you our Engineers have adopted the low value of fivepence a gallon, the value set on these oils by the Government Fuel Research Board, and even at this value the Balance-Sheet shows a works profit of 13s. 2d. on every ton of coal carbonised.

It has now been established beyond doubt that Smokeless Fuel "Coalite" and the valuable resultant oils, "Coaline," can not only be successfully produced, but that there is a ready market for these products.

The Company has taken steps to increase its plant at Barnsley.

The success achieved at Barnsley has been generally recognised by over 350 Professor and Gas and Colliery Engineers who have visited the Works.

Having now established the commercial value of the products to the point where we can secure for colliery proprietors, gas companies, and others a certain market for their "Coalite" and "Coaline" Crude Oil, we are in a position to complete negotiations for the erection of plants.

In distillations undertaken on our behalf, the crude oil obtained from one ton of coal slack has yielded ten gallons of Motor Spirit. In due course this country, which now imports 97 per cent. of all the oil fuel consumed, will obtain that commodity from its own coal deposits. When "tens of millions of tons" * are thus carbonised, England will not only produce enough oil fuel for its own consumption in times of peace or war, but will have a surplus for export. From the national point of view, and from the money-making point of view, there is nothing that promises greater results than the home production of crude oil, yielding motor spirit, lubricating oil, &c. In addition to obtaining these valuable oils, we have established that 14 cwts. of a perfect Smokeless Fuel giving greater heat than coal itself can be produced—all this from each ton of cheap coal slack, so often a difficult commodity for colliery proprietors to market.

The Patents covering this process are protected throughout the world. New and important Patents have been taken out during the past 12 months, greatly strengthening your Company's position.

(2) A factor of the highest importance in the history of Low Temperature Carbonisation is the subject-matter contained in the "Report of the Fuel Research Board for the years 1920-1921—Second Section—Low Temperature Carbonsiation" (published by His Majesty's Stationery Office). This Board was formed by the Government in 1917 for the express purpose of helping the development of supplies of oil from home sources by the carbonisation of coal, and, so important is this matter considered by the Government, that the Board are still continuing its activities, and the report, signed by Sir George Beilby, is ample evidence of the valuable work done by the Board. It will be seen that the Fuel Research Board make the very important statement that a hitherto unexpected link between the Gas Industry and Low Temperature Carbonisation is likely to be established.

Their report shows the great importance and value of the rich gases that can be produced by Low Temperature methods, and are valued by them at 10s. per ton of coal carbonised. Our Engineers guarantee to produce such gases. The profits of 13s. 2d. per ton are based by our Engineers from their working results, allowing nothing whatever for the sale value of the surplus gas.

(3) Referring to a leading article in the "Gas Journal" of 14th June, commenting on a report made by Mr. W. Chaney, late Engineer of the Birmingham Gas-Works, special stress is laid on the advantage of gas companies erecting Low Temperature Retorts as part of their plant. Mr. Chaney has since made an estimate based on the figures of the Fuel Research Board showing that during the year 1921 one of the largest gas companies alone could have effected a saving of One million sterling per annum by using the rich Low Temperature Gas mixed with their ordinary gas supply.

(4) A further important factor is the use to which "Coalite" in powdered form can be put for boiler firing and furnace work. This process brings "Coalite" into use in the industrial world. Tests on a large scale have been carried out at Edgar Allen and Company's Steel Works, Sheffield, at Price's Candle Works, Battersea, &c., by the Powdered Fuel Plant Company, Limited, and a remarkable report has been received from them, stating, amongst other things, that "there is no reason why, when considering a boiler installation complete with super-heater and economiser and fired by means of Powdered Coalite, an efficiency of 85 to 86 per cent. should not be maintained."

The increasing difficulties of many collieries in disposing of their coal slack, coupled with the fact that gas companies are fast realising that Low Temperature methods will be necessary to them, have lately caused a great increase in the inquiries for plants.

By Order of the Board,
LOW TEMPERATURE CONSTRUCTION, LIMITED,
H. SCHOLFIELD,
Secretary.

By Order of the Board,
LOW TEMPERATURE CARBONISATION, LIMITED,
J. H. MACAULAY,
Secretary.

* See Fuel Research Board's Report.

KENDAL GAS DEPARTMENT.

The report to his Committee of Mr. W. R. Wilson, the Engineer and Manager of the Kendal Corporation Gas and Water Department, for the year ended March 31, shows that the gross profit amounts to £2944, to which must be added £450 for interest. After setting aside £4839 for interest and sinking fund charges, there is a net deficit of £1444, which is charged against an accumulated surplus of £1423, leaving a debit balance of £20. The total quantity of coal carbonized during the year was 7244 tons; the cost delivered at the breaker being 48s. per ton. The gas made was 102,189,000 c.ft., being a decrease of 3,089,000 c.ft., or 3·02 p.ct. The quantity sent out from the works, including public lighting, was 92,831,600 c.ft., a decrease of 3·29 p.ct. There are at present 2057 ordinary and 2170 prepayment consumers, an increase of 29 over last year. The receipts for coke show a decrease of £556, for tar of £943, and for sulphate of ammonia of £749. The vertical retort plant has been in use 6½ years. No. 1 setting and producer were renewed last year, and No. 2 setting and producer this year (1922). A sum should be set aside annually to provide for future renewal every four years.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 17.

The position of London tar products is quite steady, with a continued tendency upwards in prices. Pitch is in demand for export next season, and the price appears to be 75s. to 77s. 6d. net f.o.b. at makers' works. The optimistic views attributed to some producers ought, of course, to be qualified by consideration as to what price the foreign briquette makers can afford to pay for pitch to enable them to sell briquettes in competition with coal. It is understood that makers are well sold in creosote; and the price quoted is 6¼d. to 6½d. net per gallon in bulk at works for substantial lots. Solvent naphtha is temporarily easier at about 2s. 3d. per gallon naked; but it is rather difficult to understand this setback. Other products are unchanged.

Tar Products in the Provinces.

July 17.

The average values for gas-works products during last week were: Gas-works coal tar, 41s. 6d. to 46s. 6d. Pitch, East Coast, 73s. to 75s. f.o.b. West Coast—Manchester, 68s. to 70s.; Liverpool, 70s. to 72s.; Clyde, 72s. to 73s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 5½d. to 5⅝d.; salty, 5½d. to 5⅝d. Scotland, 4½d. to 4⅝d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. 1d. to 2s. 2d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

There is a rather better feeling in the market for bye-products, with some tendency for the demand to improve. Whether it will improve sufficiently to cause a scarcity of materials remains to be seen. Should it do so, it is quite impossible to make equivalent progress in production; and consequently higher prices may be looked for. Distillers are still short of raw material, and there is no prospect of any change yet. The position in pitch has not changed materially, and export lots are still being booked at 75s. per ton f.o.b. Home requirements are being met at prices ranging between 67s. 6d. in the North of England to 87s. 6d. in South Wales, and there is once again talk of the possibility of the market reaching £5 per ton, although at the moment this looks an outside figure. The demand for solvent naphtha has improved, and with not much offered prices are very firm, but without change. Naphthalenes are still dull; crude ranging from £5 to £9, and refined about £16 per ton. Creosote is firm, with a steady inquiry; and sales for delivery towards the end of August are still being made upon the basis of 5½d. to 6d. per gallon. Cresylic acid is not much changed, although some export orders have been booked for pale 97-99 p.ct. at 2s. 4d. per gallon; dark 95-97 p.ct. still making 2s. Carbolic acid is not much changed. There is little demand for crystals, and certainly not very much profit in making it at the present quotation while crude remains where it is. It would seem, however, that crude carbolic is likely to advance. The latest values are 2s. per gallon for crude and 6d. per lb. for crystals. In intermediate products, export interest is still well maintained; but the home trade has been quiet, without any material change in quotations.

Sulphate of Ammonia.

There is nothing fresh to report with regard to sulphate of ammonia beyond the continuation of the strong export request. The home demand is at present inactive, although some revival may be looked for in the course of the next six weeks. There is no change in quotations.

"Accidental death" was the verdict returned by the Deputy Coroner for Devonport, at an inquiry into the death of a naval pensioner named James Callicott, who was found dead in bed by his wife, with the bedroom full of gas. The wife told the Coroner that she found deceased lying in bed dead, and the room smelling strongly of gas. There was a gas-bracket in the room, and connected with it was another jet, to which to attach tubing for a gas-ring. The tubing was off the jet, the tap of which was turned on. She had a slot-meter, and the day before the occurrence there was no money in it, until she inserted 6d. in the afternoon. The tap must have been left turned on when last used.

Suggested Gas-Works Purchase at Newport (Salop).—The Newport (Salop) Urban District Council last week considered the question of acquiring the local gas undertaking from the Company. After some discussion, they appointed a Committee to go into the desirability of such a step.

Boston (Lincs.) Gas Company.—Very small profits were revealed by the annual report presented last Thursday at the meeting of the Boston Gas Light and Coke Company; the net gain on the past year's working having amounted to £348 only, after writing-off £688 for depreciation. This small margin, it was explained, had been due to the heavy fall in the prices of residuals, and to additional expenditure arising from the coal strike. Out of £4123 standing to the credit of the profit and loss account, the full statutory dividend was directed to be paid.

Brechin Gas Company.—In the annual report of the Company, the Directors recommend payment of a dividend on the ordinary shares of 8 p.ct. free of income-tax, which will absorb £1440 at the credit of the profit and loss account, leaving a balance of £260 to be carried forward, subject to Directors' remuneration. The Directors propose to reduce the price of gas by 5d. per 1000 c.ft. as from Sept. 1; and they hope to be in a position to announce a further reduction during the present financial year. The proposed reduction will make the price 5s. 5d. per 1000 c.ft.

Spalding Gas Profits.—A question in relation to the utilization of accumulated profits upon the gas undertaking was discussed at the last meeting of the Spalding Urban District Council, arising out of a recommendation that £542 should be expended out of the current year's revenue for relaying gas-mains. It was suggested that this outlay should have been met from a sum of £5000 standing to the credit of the undertaking. The Clerk explained, however, that £2000 of the accumulated profits was being spent on new boilers, and that, as no depreciation was allowed in respect of mains, it had been decided to spend this year's profit on that work, instead of paying it to the Government in income-tax.

Bristol Gas Charges.—The Finance Committee of the Bristol City Council, reporting on the Bristol Gas (Charges) Order, 1922, state that they considered it desirable to obtain the advice of a financial expert, and engaged Mr. Arthur Collins, who has had considerable experience in dealing with the applications by gas undertakings for a revision of maximum prices. Mr. Collins, having examined the Gas Company's books and accounts for some years past in great detail, advised the Committee that the Corporation could not reasonably contend for a lower maximum figure than 15d. per therm, having regard to the provisions of the Gas Regulation Act; and after negotiations the Company accepted this figure, which has been inserted in the Order. The Committee inform the Council that the new unit of charge for gas takes effect as from the end of the June quarter; and the Company have given notice that the charge for gas will be 9·2d. per therm, which equals 3s. 8·16d. per 1000 c.ft., and represents a total reduction of nearly 10d. per 1000 c.ft. since December, 1921.

Murdoch's House Destroyed by Fire.—Last week the house at Redruth, formerly occupied by William Murdoch, was burned down. A granite tablet on the east wall was as follows: "William Murdoch lived in this house, 1782 to 1798; made the first locomotive here, and tested it, 1784; invented gas lighting, and used it in this house in 1792." The house, according to antiquaries, was formerly an ancient chapel, and part of its woodwork was carved and extremely old.

Elstree Gas Company's Powers.—Reporting on the Elstree and Boreham Wood Gas Company's powers, the Hertfordshire County Council state that the Company had applied to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act to extend their works; and that objections had been lodged on behalf of the Hertfordshire County Council and the Watford Rural District Council. Since then a meeting had been held with representatives of the Company, who agreed to amend the Order, in order to meet the objections put forward by the Hertfordshire County Council; and it has not therefore been necessary to take any further action in the matter. With regard to the application by the Company under section 1 of the Act, the Company asked the Board of Trade to substitute a charge of 17·2d. per therm for 4s. 7d. per 1000 c.ft.; and the Committee were of opinion that 15d. per therm was a proper price. Negotiations have been carried on with the Company, who have agreed to fix the new standard price at 16d. per therm. The opposition of the County Council to the application has therefore been withdrawn.

Birmingham Gas Undertaking Figures.—Mr. A. W. Smith, the General Manager and Secretary of the Birmingham Gas Department, was the speaker at the weekly luncheon last week of the local Rotary Club. He referred to that much maligned instrument, the gas-meter. Many complaints came in; but the trouble was almost entirely with quarterly account consumers. In nearly every case where a meter that had been complained about was tested, it had been confirmed in its accuracy; and where there had been an error, practically always it was in favour of the consumer. The weather was so changeable that domestic consumers, by the time they had to pay, could not realize they had used so much gas three months previously. As showing the development of the undertaking, he mentioned that in 1875, when the Companies were about to hand over their undertakings to the municipality, the amount of gas sent out by them annually was 1800 million c.ft.; while at the present time the department supplied almost as much in one winter month. In 1918, no less than 56 million c.ft. were distributed in 24 hours—this being the Birmingham record for one day.

The Solihull Gas Company are reducing the price of gas by 1d. per therm, or 4½d. per 1000 c.ft.

The Directors of the Kirkham Gas Company have decided to reduce the price of gas from 6s. to 5s. 6d. per 1000 c.ft., subject to the usual discounts.

The Thorne Gas Company announce a reduction in the charge for gas for lighting from 7s. 6d. to 7s. per 1000 c.ft., and for cooking from 6s. 8d. to 6s.

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